No. 774

IN THE

UNITED STATES CIRCUIT COURT OF APPEALS

FOR THE NINTH CIRCUIT.

TRANSCRIPT OF RECORD.

JOSEPH R. DE LAMAR,

Appellant,

VS.

THE DE LAMAR MINING COMPANY, LIMITED,

Appellee.

VOL. I.

(Pages 1 to 384, inclusive.)

Upon Appeal from the United States Circuit Court for the District of Idaho.

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In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR, Complainant, vs. THE DE LAMAR MINING COMPANY, LIMITED, Respondent.	No. 177.

Bill of Complaint.

To the Honorable, the Judges of the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho:

Joseph R. De Lamar, a citizen of the United States, and a resident of the city, county and State of New York, brings this his bill of complaint against the De Lamar Mining Company, Limited, a corporation created, organized, and existing under and by virtue of the laws of the kingdom of Great Britain, and a citizen of that kingdom.

And thereupon your orator complains and says that the said respondent corporation, so organized and existing as aforesaid, has had its office and general place of business in the city of London for several years last past, and during all that time has had, and still has, its works and principal place of business operations in the county of Owyhee, in the State of Idaho, within this District, where during all said time said respondent has owned and operated extensive mining property.

And your orator further shows that heretofore and before the 6th day of March, 1896, one Martin E. Waldstein, then of New York City, State of New York, was the original and first inventor and discoverer of a certain new and useful improvement in processes of recovering precious metals from their solutions, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use, sale or on sale for more than two years prior to his application for a patent therefor.

And your orator further shows that the said Martin E. Waldstein, so being the inventor of said improvements, on said last-named date, made application to the Commissioner of Patents for letters patent of the United States for such improvements, in accordance with the then existing laws of the United States, and therein complied in all respects with the conditions and requirements of said laws.

And your orator further shows that thereafter, on the 30th day of December, 1897, the said Martin E. Waldstein by an instrument in writing duly assigned, transferred, and set over unto the complainant, the above-named Joseph R. De Lamar, an undivided two-thirds interest in and to said improvements in said processes aforesaid, and the right to the patent therefor, the said right to said improvement to be held and owned by said Martin E. Waldstein and said Joseph R. De Lamar jointly in the following proportions, viz., one-third interest therein in the said Martin E. Waldstein and two-thirds interest therein in the said Joseph R. De Lamar; United States patent to issue one-third in the said Waldstein and two-thirds in the said De Lamar, which said assignment was duly recorded on the 30th day of April, 1898, in the Patent Office of the United States, in Liber "G" 59, page 15, as by said assignment, with the certificate of recording thereto affixed, or a duly certified copy of said assignment in court to be produced will more fully and at large appear.

And thereafter, on the 19th day of July, 1898, letters patent of the United States of America, numbered 607,719, signed sealed and executed in due form of law, and bearing date the day and year last aforesaid, were duly issued to and delivered to the said Martin E. Waldstein and Joseph R. De Lamar, whereby there was secured to them and their heirs and assigns for the full term of seventeen years from the 19th day of July, 1898, the full and exclusive right of using, vending and employing said improvements throughout the United States and the territories thereof, as by a certified copy of said letters patent in court to be produced will more fully appear, said improvements as set forth in said letters patent aforesaid and the specifications thereto annexed, consisting in the use substantially as claimed in said specifications, of zinc dust, composed of zinc and zinc oxide in recovering precious metals from cyanide solutions, said zinc dust being kept in a state of agitation, and being supplied and used as a precipitating reagent in definite quantities, the quantity of said zinc dust supplied being only a sufficient quantity to thoroughly precipitate the contained metals, substantially as described in said specifications.

And your orator further shows that thereafter and on the 24th day of May, 1899, the said Martin E. Waldstein, by an instrument in writing, and for a valuable consideration, duly sold, transferred, and assigned unto your orator the whole of his, said Waldstein's, undivided one-third part of the whole right, title, and interest in and to said invention, and in and to the said letters patent therefor aforesaid No. 607,719, being all the interest of said Waldstein therein, together with all the rights which accrued to him by virtue of said invention and said letters patent, including all actions and causes of action for any and all infringements of the rights acquired by virtue of said letters patent, which said assignment was duly recorded on the 7th day of June, 1899, in Liber "D," 59, page 204, of Transfer of Patent, in the Patents Office of the United States, as by said assignment, with the certificate of recording thereto affixed, or a duly certified copy of said assignment in court to be produced will more fully and at large appear.

And your orator further shows that but for the infringements herein complained of, your orator would still be in the undisturbed possession, use, and enjoyment of the exclusive privilege secured by the said letters patent, and in receipt of the profits for the use of the same by others.

And your orator further shows that the respondent is the owner, and in the possession, and is working, operating, and managing certain mines and mining property in the county of Owyhee in the said State of Idaho, within this District, and in the working and operation of said mines and mining property employs, uses, and operates mills and milling plants for the reduction of the ores and minerals found in and upon its said mining property. That in the use and operation of its said mills and milling plants and in the reduction of the ores and minerals found in and upon said mines and mining property said respondent employs and uses a certain process for the extraction of the precious metal from such ores and minerals, known as and commonly called the "cyanide process," which consists generally in the use as a solvent, of a solution of cyanide of potassium applied to the powdered ores extracted from such mines and mining property, which solution after the application thereof to the powdered ores, extracts, keeps and holds in solution the precious metals contained in such ores. That in order to recover from such cyanide solution the precious metals contained therein as aforesaid, it is requisite and necessary to treat such solution with a chemical reagent, such as is provided for in the said letters patent above mentioned and referred to.

And your orator further shows that since the date of said letters patent aforesaid and the rights secured thereby, and by the application for said letters patent as hereinbefore alleged, the said respondent herein named, well knowing all the facts hereinbefore set forth, and not being able to profitably work and operate its said mines and mining property and extract the precious metals from the ores thereof, and precipitate the same from the solution containing the same, clandestinely, secretly, without the knowledge or consent of your orator and against his will, and with intent to cheat and defraud your orator in the premises, and in violation of your orator's said exclusive rights secured to him by virtue of said letters patent and the assignments aforesaid, has willfully and unjustly, and without any right or license whatever, been and still is infringing the said letters patent, and appropriating to its own use said process and improvements aforesaid, by using in the treatment of its said ores in its said mines and mills aforesaid the aforesaid patented improvements in the processes of obtaining the precious metals from the ores mined and extracted from its said mines and mining property. That the method of using said process and improvements by said respondent in violation as aforesaid of the rights of your orator and against his will as aforesaid is substantially as follows: By reducing the ore to a state of minute subdivision, treating said pulverized ores and extracting the precious metals therefrom by means of an aqueous solution of cyanide of potassium, and when such precious metals are in solution, in treating such solution with zinc dust, composed of zinc and zinc oxide in a state of agitation, said zinc dust being used as a precipitating reagent by using a definite quantity of said zincdust in astate of agitation, the quantity of said zinc dust being supplied in only a sufficient amount to thoroughly precipitate the contained metals, and afterwards recovering said metals from the valuable precipitate by filtration or otherwise, substantially as described in the specifications and claims attached to said letters patent numbered 607,719, which are hereby referred to and made a part of this bill of complaint.

And your orator further shows that by the use of said improvements aforesaid and the infringement of the right of your orator as aforesaid said respondent has recovered the precious metals contained in upwards of 75,000 tons of ores as your orator is informed and believes, and that by such use of said process and the infringement of the rights of your orator said respondent has made large profits and been enabled to pay large dividends upon its stock. That by reason of the willful, surreptitious use of said process as aforesaid your orator has been greatly damaged, all which acts and doing by said respondent are contrary to equity and good conscience, and tend to the manifest injury of your orator in the premises, and your orator has repeatedly requested the said respondent to desist from the said infringements and wrongful acts, but that said respondent, notwithstanding, persists in continuing the same to the great damage and injury of your orator, to wit, to his damage in the sum of $75,000.

Forasmuch as your orator can have no relief adequate, except in this Honorable Court, and to the end, therefore, that the respondent may, if it can, show why your orator should not have the relief hereby prayed, and may make a full disclosure and discovery of all the matters aforesaid, and according to the best and utmost of its knowledge and remembrance, information and belief, full, true, direct, and perfect answer make to the matters hereinbefore stated and charged, but not under oath, an answer under oath being hereby expressly waived.

And that the respondent may be decreed to account for and pay over the income or profits thus unlawfully derived from the violation of your orator's rights, and be restrained from any further violation of said rights, your orator prays that your Honors may grant a writ of injunction issuing out of and under the seal of this Honorable Court, perpetually enjoining and restraining the said respondent, its clerks, attorneys, agents, servants, and employees from any further use, sale, or application in any manner of said patented improvements or any part thereof, in violation of your orator's rights as aforesaid.

And that your Honors, upon the rendering of the decree above prayed may assess or cause to be assessed, in addition to the profits to be accounted for by the respondent as aforesaid, the damages your orator have sustained by reason of such infringements, and that your Honors may increase the actual damages so assessed to a sum equal to three times the amount of such assessment under the circumstances of the willful and unjust infringements by said respondent as herein set forth.

And your orators further pray for such other and further relief as the equity of the case may require, and to your Honors may seem meet and proper.

May it please your Honors to grant unto your orator, not only a writ of injunction conformable to the prayer of this bill, but also a writ of subpoena of the United States of America, directed to the said The De Lamar Mining Company, Limited, a corporation, commanding it on a day certain to appear and answer unto this bill of complaint, and to abide and perform such order and decree in the premises as to the Court shall seem proper and required by the principles of equity and good conscience.

W. H. DICKSON,

A. C. ELLIS,

DICKSON, ELLIS & ELLIS,

Solicitors for Complainants and of Counsel.

United States of America,
State of New York, } ss.
County of New York.

Joseph R. De Lamar, being first duly sworn, upon his oath doth depose and say: I am the complainant above named and have read the above and foregoing bill of complaint, and know the contents thereof, and that the same is true of my own knowledge, except as to the matters therein stated upon information or belief and as to those matters I believe it to be true.

JOSEPH R. DE LAMAR.

Subscribed and sworn to before me this 12th day of July, 1899.

[Seal] A. W. ZIMMERMANN,

Notary Public for Kings County. Certificate filed in New York County.

[Endorsed]: No. 177. United States Circuit Court, Central Division, District of Idaho. Joseph R. De Lamar vs. The De Lamar Mining Company Limited. Bill of Complaint. Filed August 14th, 1899. A. L. Richardson, Clerk.

Praecipe for Subpoena.

August 12th, 1899.

Clerk United States Circuit Court, Boise City, Idaho.

Dear Sir: Enclosed please find bill of complaint in the case of Joseph R. De Lamar vs. The De Lamar Mining Company, Limited.

Please be good enough to file the same and issue subpoena, and place the same in the hands of the United States Marshal for service.

* * * * * * * *

Very respectfully yours,

DICKSON, ELLIS & ELLIS.

[Endorsed]: No. 177. Filed August 14th, 1899. A. L. Richardson, Clerk.

In the Circuit Court of the United States for the Central Division of the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.
} No. 177.

Subpoena ad Respondendum.

The President of the United States of America to The De Lamar Mining Company, Limited, Greeting:

You and each of you are hereby commanded that you be and appear in said Circuit Court of the United States, at the courtroom thereof, in Boise, in said District, on the first Monday of October next, which will be the second day of October, A. D. 1899, to answer the exigency of a bill of complaint exhibited and filed against you in our said Court, wherein Joseph R. De Lamar is complainant and you are defendant, and further to do and receive what our said Circuit Court shall consider in this behalf, and this you are in nowise to omit under the pains and penalties of what may befall thereon.

And this is to command you the marshal of said District, or your deputy, to make due service of this our writ of subpoena and to have then and there the same.

Hereof fail not.

Witness the Honorable MELVILLE W. FULLER, Chief Justice of the Supreme Court of the United States, and the seal of our said Circuit Court, affixed at Boise, Idaho, in said District, this 15th day of August, in the year of our Lord one thousand eight hundred and ninety-nine, and of the independence of the United States the one hundred and twenty-fourth.

[Seal] A. L. RICHARDSON,

Clerk.

Memorandum Pursuant to Equity Rule No. 12 of the Supreme Court of the United States.

The defendant is to enter his appearance in the above-entitled suit in the office of the clerk of said court on or before the day at which the above writ is returnable;

otherwise the complainant's bill therein may be taken pro confesso.

I hereby certify that I served the certified copy of the within subpoena ad respondendum and complaint upon E. Oxford, the legal agent of the De Lamar Mining Company, Limited, at De Lamar, on the 16th day of August, 1899.

FRANK C. RAMSEY,
United States Marshal.
By Joseph Pinkham,
Deputy.

[Endorsed]: No. 177. In the Circuit Court of the United States for the Central Division of the District of Idaho. In Equity. Joseph R. De Lamar vs. The De Lamar Mining Company, Limited. Subpoena ad Respondendum. Returned and filed. August 18th, 1899. A. L. Richardson, Clerk.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho.

JOSEPH R. DE LAMAR,
Plaintiff,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.

Praecipe for Appearance.

To A. L. Richardson, Esq., Clerk of the Above-entitled Court.

You will please enter our appearance for the above-named defendant in the above-entitled suit, on the October rule day, 1899.

Boise City, Idaho, October 2, 1899.

Very respectfully,

JOHNSON & JOHNSON,

Solicitors for Defendant, No. 922 Sixth Street, Boise City, Idaho, where notices and papers in the case are to be served upon us.

[Endorsed]: No. 177. In the Circuit Court of the United States, Ninth Circuit, District of Idaho. Joseph R. De Lamar, Plaintiff, vs. The De Lamar Mining Company, Limited, Defendant. Praecipe for Appearance. Filed October 2d, 1899. A. L. Richardson, Clerk. By H. L. Richardson, Deputy. Johnson & Johnson, Solicitors for Defendant.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Respondent.
} No. 177.

Praecipe for Appearance of Additional Counsel.

To the Clerk of Said Court:

In the above-entitled cause please enter the appearance of John H. Miller, Esq., Counselor at Law, of 101

Sansome street, San Francisco, California, as additional counsel with us, for said respondent, as of the date of the filing hereof.

JOHNSON & JOHNSON,
Solicitors and Counsel for Respondent.

[Endorsed]: No. 177. United States Circuit Court, Central Division, District of Idaho. Joseph R. De Lamar, Complainant, vs, The De Lamar Mining Company, Limited, Respondent. Praecipe for Appearance of Additional Counsel. Filed January 1, 1900. A. L. Richardson, Clerk. Johnson & Johnson, Solicitors for Respondent.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR, Complainant, vs. THE DE LAMAR MINING COMPANY, LIMITED, Respondent.	No. 177.

Application and Order Extending Time to Answer.

District of Idaho, County of Ada. } ss.

Richard Z. Johnson, being first duly sworn, deposes and says: That he is a member of the firm of Johnson & Johnson, who are the solicitors in the above-entitled suit for the above-named defendant, and as such entered their appearance for said defendant herein at the last rule day, as required by the subpoena herein issued and served, and by the rules of the court. That the above-entitled suit is in equity against said defendant for alleged infringements by said defendant of letters patent of the United States, under which plaintiff claims, alleged to have been granted for an improvement in the process of recovering precious metals from their solutions. That as alleged in the bill of complaint, said defendant is a foreign corporation "created, organized, and existing under and by virtue of the laws of the kingdom of Great Britain," and "has had its office and general place of business in the City of London for several years last past," and said defendant still has its corporate office and general place of business and its corporate seal in the city of London, and, as affiant is informed and believes, its corporate officers are all citizens and residents of the kingdom of Great Britain, and none of said officers are now within the United States or are likely to be during the course of the present year. That immediately upon the service of the subpoena in this suit the agents and solicitors of defendant took immediate steps to secure the facts and information necessary to enable defendant to fully answer the bill of complaint filed herein. That in pleading defendant's defense it is necessary for defendant to set up in his answer numerous records of the Patent Office of the United States, and of the Patent Office of the kingdom of Great Britain and the number, date of numerous patents and the names of the persons to whom they were granted; and also numerous publications made in the United States and England giving the names of the authors and the names and address of the publishers and designating the particular parts cited. That the solicitors of defendant have already secured and been furnished with many of said records and publications, and have prepared a draft of an answer, but other records and publications which affiant expects to be able to secure, and which are important to enable defendant to fully answer said bill of complaint, have not as yet been received by the solicitors of defendant, and although said solicitors have used their best diligence they have been unable to complete said answer, or to secure its attestation by the corporate seal of the defendant, or by its officers, in time to file the same at the next rule day. That after the completion of said answer it will be necessary for the solicitors of defendant to send it to London, England, to be attested by the corporate seal of defendant; to do which and secure its return, at this season of the year, will probably require more than thirty days. That the solicitors of defendant long since applied through local solicitors in Washington and London for the records, publications, and documents necessary to enable them to prepare defendant's answer, and have already received most of the documents and certified copies of most of the records that they deem necessary, and they expect to receive, and affiant believes that they will receive the additional information, documents, copies of records, and publications to enable them to complete said answer within the next twenty days, and that they will be able to complete the same and have the same attested by the corporate seal of the defendant by the rule day of January next. That this application is not made for delay merely, but that the defendant may be able to fully answer the bill of complaint as required by the rules and practice of this court and the laws of the United States thereunto applicable, and that justice may be done between the parties. That if defendant is compelled to file an incomplete answer herein and to apply for leave to amend the same hereafter, it will probably necessitate greater delay than is herein applied for. That affiant has fully examined the facts in the case and the nature and validity of defendant's defense therein, and believes that he is better acquainted therewith than is any officer of the defendant, and affiant believes that defendant has a good and legal defense to this suit on the merits. That the superintendent or manager of the works and business of the defendant, in this State, is now absent from the State and in the State of California, and affiant knows of no agent or employee of defendant now in this State, except its solicitors who is qualified by knowledge of the facts to make an affidavit in the premises.

Wherefore defendant asks that the time for answering said bill of complaint be extended to the rule day in January, 1900.

RICHARD Z. JOHNSON.

Subscribed and sworn to before me this 27th day of October, 1899.

[Seal] SHERMAN G. KING,

Notary Public, Ada County, Idaho.

Upon reading and filing the foregoing application it is ordered that the time for defendant to answer the bill of complaint in the above-entitled suit be, and the same is hereby, extended to and until the rule day in January next, 1900.

Dated October 30th, 1899.

JAS. H. BEATTY,

Judge.

[Endorsed]: No. 177. United States Circuit Court, Central Division, District of Idaho. Joseph R. De Lamar vs. The De Lamar Mining Company, Limited. Application and Order Extending Time to Answer. Filed November 6th, 1899. A. L. Richardson, Clerk. By E. B. Yarington, Deputy. Johnson & Johnson, Solicitors for Defendant.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR, Complainant, vs. THE DE LAMAR MINING COMPANY, LIMITED, Respondent.	No. 177.

Answer.

The answer of the De Lamar Mining Company, Limited, Respondents, to the Bill of Complaint of Joseph R. De Lamar, Complainant.

This respondent, now and at all times saving and reserving unto itself all benefit and advantage of exception which can or may be had or taken to the many errors, uncertainties, and other imperfections in the bill contained, for answer thereto or unto so much thereof as this respondent is advised it is material or necessary for it to make answer unto, says: Admits that this respondent is a corporation, created, organized, and existing under and by virtue of the laws of the kingdom of Great Britain and has its office and general place of business in the city of London, and has had, and still has, its works and principal place of business operations in the county of Owyhee, in the State of Idaho, and owns and operates mining property therein.

2. And further answering, respondent denies that before the 6th day of March, 1896, or at any other time, Martin E. Waldstein, mentioned in the bill of complaint, was the original or first or other inventor or discoverer of the alleged new and useful improvement in process of recovering precious metals from their solutions, mentioned in the bill of complaint; denies that the same was not known or used by others in this country, nor patented or described in any printed publication in this or any foreign country before the alleged invention or discovery thereof by the said Waldstein; denies that the same was not in public use or on sale for more than two years prior to the application of the said Waldstein for a patent therefor.

3. And further answering said bill of complaint this respondent says that it does not know and it is not informed save by the said bill of complaint, whether the said Martin E. Waldstein, on the 6th day of Mach, 1896, or at any other time, made application to the Commissioner of Patents for letters patent of the United States for said alleged improvement in accordance with the then existing laws of the United States, and therein complied in all respects with the conditions and requirements of said law, and therefore this respondent leaves the complainant to make such proof of said allegation as he may be advised is necessary and proper.

4. And further answering said bill of complaint, this respondent says that whether or not on the 30th day of

December, 1897, or at any other time, the said Martin E. Waldstein by an instrument in writing duly or otherwise assigned, transferred, or set over unto the complainant Joseph R. De Lamar an undivided two-thirds interest in and to said alleged improvement in said process and the right to the patent therefor, or whether the said right to said alleged improvement was to be held and owned by said Martin E. Waldstein and the said Joseph R. De Lamar jointly in the following proportions, viz., one-third interest therein in the said Martin E. Waldstein and two-thirds interest therein in the said Joseph R. De Lamar, or whether the United States patent that was applied for was to issue one-third in the said Waldstein and two-thirds in the said De Lamar, or whether said assignment was duly or otherwise recorded on the 30th day of April, 1898, or at any other time in the Patent Office of the United States in Liber "G," 59, page 15, or whether the said facts would appear from the said assignment with the certificate of recording thereto affixed or by a duly or otherwise certified copy of said assignment which the complainant alleges is ready to be produced in court, this respondent does not know and is not informed save by the said bill of complaint, and therefore it leaves the complainant to make such poof of said facts as he may be advised is necessary and proper.

5. And further answering said bill of complaint this respondent says that whether or not on the 19th day of July, 1898, or at any other time letters patent of the United States of America numbered 607,719, or otherwise,

signed, sealed, and executed in due form of law or otherwise, and bearing date the day and year last aforesaid or any other date, were duly or otherwise issued to or delivered to the said Martin E. Waldstein and Joseph R. De Lamar, or either of them, this respondent does not know and is not informed save by said bill of complaint, and therefore it leaves the complainant to make such proof thereof as he may be advised is necessary and proper.

6. And further answering said bill of complaint this respondent denies that by virtue of the said alleged letters patent designated as numbered 607,719, there was secured to the said Martin E. Waldstein and Joseph R. De Lamar, or either of them, or to their heirs or assigns, for the full term of seventeen years from the 19th day of July, 1898, or for any other term, the full or exclusive or any right of using, vending, or employing said alleged improvement throughout the United States and the territories thereof, or any part thereof, or that such facts will more fully or will at all appear from the alleged certified copy of said alleged letters patent, which the complainant claims to be ready in court to be produced by him; denies that said alleged improvement as set forth in said alleged letters patent and the specification thereto annexed, if there be any such in existence, consists in the use substantially as claimed in said alleged specification, of zinc dust, composed of zinc and zinc oxide in recovering precious metals from cyanide solutions, said zinc dust being kept in a state of agitation and being supplied and used as a precipitating reagent in definite quantities, the quantity of said zinc dust supplied being

only sufficient in quantity to thoroughly precipitate the contained metals substantially as described in said alleged specification; and in this behalf respondent avers that if the said alleged invention is described and claimed in said alleged letters patent in the manner and form as above stated in the bill of complaint, then the said alleged letters patent are void upon their face for want of invention, in that it requires no exercise of the inventive faculty to determine the exact quantity of a precipitating reagent necessary to thoroughly precipitate the metals contained in a solution.

7. And further answering said bill of complaint this respondent says: Whether or not on the 24th day of May, 1899, or at any other time, the said Martin E. Waldstein by an instrument in writing or otherwise, for a valuable or other consideration, duly or otherwise sold, transferred, or assigned to the complainant the whole or any of his, the said Waldstein's, undivided one-third part of the whole right, title, and interest in and to said alleged invention or the alleged letters patent numbered 607,719, the same being all the interest of said Waldstein therein, together with all or any of the rights, if any, which accrued to him by virtue of said alleged invention and said alleged letters patent, including all or any actions or causes of action for any or all infringements of the alleged rights, if any, acquired by virtue of said letters patent, or that said assignment was duly or otherwise recorded on the 7th day of June, 1899, or at any other time in Liber "D" 59, page 204 of Transfers of Patents in the Patent Office of the United States, this respondent does not know and is not informed save by said bill of com-

plaint, and therefore he leaves the complainant to make such proof thereof as he may be advised is necessary and proper.

8. And further answering this respondent denies that but for the alleged infringement complained of in the bill of complaint the said complainant would still be in the undisturbed possession, use, or enjoyment of the exclusive privilege alleged to be secured to him by the said alleged letters patent, or in the receipt of profits for the use of the same by others.

9. And further answering the said bill of complaint this respondent admits that it is the owner and in the possession of, and is working, operating, and managing, certain mines and mining property in the county of Owyhee, in the said State of Idaho, and in this district, and in the working and operation of said mines and mining property employs, uses, and operates mills and milling plants for reduction of the ores and minerals found in and upon its said mining property, and that in the use and operation of its said mills and milling plants and in the reduction of the ores and minerals found in and upon said mines and mining property this respondent employs and uses a certain process for the extraction of precious metals from such ores and minerals known as and commonly called the cyanide process, which consists generally in the use as a solvent of a solution of cyanide of potassium applied to the powdered ores extracted from such mines and mining property, which solution after the application thereof to the powdered ores keeps and holds in solution the precious metals contained in such ores, and that in order to recover from such cyanide solution the precious

metals contained therein it is requisite and necessary to treat such solution with a chemical reagent, but denies that it is requisite and necessary to use such a chemical reagent as is provided for in the said alleged letters patent.

10. And further answering said bill of complaint this respondent denies that it, since the date of said alleged letters patent or at any time, well knowing or knowing at all the facts set up in the bill of complaint or any of them, or not being able to profitably work and operate its said mines and mining property, and extract the precious metals from the ores thereof and precipitate the same from the solution containing the same, clandestinely or secretly or without the knowledge or consent of complainant, or against its will, or with intent to cheat or defraud complainant, or in violation of complainant's alleged exclusive rights alleged to be secured to him by virtue of said alleged letters patent and assignment thereof, or otherwise, or at all, has willfully or unjustly or without any right or license, or otherwise or at all, been or still is infringing said alleged letters patent, or appropriating to its own use the alleged process and improvement by using it in the treatment of its said ores in its said mines and mining property; denies that this respondent has ever used or is now using the alleged process claimed to be patented in and by said letters patent; denies that the process used by this respondent at its said mines and mining property, is substantially as follows: By reducing the ores to a state of minute subdivisions, treating said pulverized ores and extracting the said precious metals therefrom by means of an aqueous

solution of cyanide of potassium, and when such precious metals are in solution, in treating such solution with zinc dust and zinc oxide in a state of agitation, said zinc dust being used as a precipitating reagent by using a definite quantity of said zinc dust in a state of agitation, the quantity of said zinc dust being supplied in only a sufficient amount to thoroughly precipitate the contained metals and afterwards recovering the said metals from the valuable precipitation by filtration or otherwise, substantially as described in the specification and claims attached to said alleged letters patent No. 607,719.

11. And further answering said bill of complaint respondent denies that by the use of said alleged improvement or the alleged infringement of the pretended rights of complainant under said alleged letters patent this respondent has recovered the precious metals contained in upwards of seventy-five thousand or any number of tons of ores, or that by such use of said alleged process and the alleged infringement of the pretended rights of complainant this respondent has made large or any profits, or been enabled to pay large or any dividends upon its stock; denies that by reason of any willful or surreptitious or other or any use of said alleged process complainant has been greatly or at all damaged, or that any acts or doings by this respondent are contrary to equity and good conscience, or tend to the manifest injury of complainant, or that the complainant has repeatedly or ever requested respondent to desist from said alleged infringements and said alleged unlawful acts, or that this respondent, notwithstanding, persists in continuing to use the said alleged process to the damage and injury of

complainant in the sum of seventy-five thousand dollars, or in any other sum, or to any damage or injury whatever of the complainant, or at all.

12. And further answering said bill of complaint this respondent avers that the alleged process sought to be covered, protected and patented in and by the claims of the said alleged letters patent No. 607,719 was not at the time of its production by Martin E. Waldstein, if the same ever was produced by him, a new and useful art within the meaning and intent of section 4886 of the Revised Statutes of the United States, and therefore was not patentable as such, and the alleged letters patent claimed to have been issued therefor are illegal and void, in that they do not cover a patentable subject matter.

13. And further answering said bill of complaint, this respondent avers that the alleged process sought to be covered, protected, and patented in and by said alleged letters patent No. 607,719 did not require the exercise of the inventive faculty for its production, if the same ever was produced by the said Martin E. Waldstein, but nothing more than the ordinary skill of persons skilled in the art to which the same relates was required in order to produce the same, and for that reason said alleged letters patent are illegal and void.

14. And further answering said bill of complaint, this respondent avers that the claims of said alleged letters patent No. 607,719 are vague, indefinite, and uncertain in this, that it cannot be ascertained therefrom the quantity of zinc used in precipitating the metals from a given quantity of cyanide solutions, it being stated in said claims merely that the quantity of zinc dust so used must

be only a sufficient quantity for the purpose stated, but how to ascertain what is a sufficient quantity nowhere appears in the said claims or the specification, for which reason said alleged letters patent are illegal and void.

15. And further answering said bill of complaint, this respondent avers that at the time of making the application to the Commissioner of Patents for the said alleged letters patent, the said Martin E. Waldstein did not file in the Patent Office, nor is there contained in or annexed to said alleged letters patent, a written description of the said alleged invention or of the manner and process of making, compounding, and using the same, in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it appertains or with which it is most nearly connected, to make, compound or use the same, nor did he particularly point out or distinctly claim the parts, improvements, or combinations which he claims as his invention or discovery.

16. And further answering said bill of complaint, this respondent avers that for the purpose of deceiving the public the description and specification filed by the said Martin E. Waldstein in the Patent Office, and upon which he obtained said letters patent, if any such ever were obtained, was made to contain less than the whole truth relative to his alleged invention or discovery in this, that an essential part of said alleged process consists in the use of such quantity of zinc dust as is exactly necessary to precipitate the precious metals from cyanide solutions, but there is no direction or statement, or rule, or standard, or mode, or manner set out anywhere in said alleged letters patent or specification or claims, whereby

a person desiring to practice the said alleged process can find out or ascertain how much zinc dust it is necessary to use in a given case, but it is necessary, if he desires to use the process, to experiment and to guess at the quantity of zinc dust which must be used, and even then it is almost impossible for him to know whether he is using the alleged patented process or not, for which reason this respondent avers that the said alleged letters patent are illegal and void, and confer no rights whatever upon the patentee or his assignee.

17. And further answering said bill of complaint, this respondent avers that the said Martin E. Waldstein and the complainant herein surreptitiously and unjustly obtained the alleged letters patent, if any such were ever obtained, for that which was in fact invented by others, to wit, Henry Livingstone Sulman and F. L. Teed, both residing in the city of London, who were using reasonable diligence in adapting and perfecting the same.

18. And further answering said bill of complaint, respondent avers that long prior to the application of the said Martin E. Waldstein for the alleged letters patent he had actually abandoned the said alleged invention to the public.

19. And further answering said bill of complaint, respondent avers that the said alleged invention had been in public use and on sale in this county for more than two years prior to the application of the said Martin E. Waldstein for his said alleged letters patent.

20. And further answering said bill of complaint, this respondent avers that long prior to the supposed invention or discovery of the said alleged invention by the

said Martin E. Waldstein the same had been patented and described in the following letters patent:

1. Letters patent of the United States No. 74,791, granted to Gustave Bischof, Jr., and John L. Kidwell on February 25, 1868.

2. Letters patent of the United States No. 323,222, granted to Jerome W. Simpson on July 28, 1885.

3. Letters patent of the United States No. 418,137, granted to the Cassel Gold Extracting Co., Limited, on December 24, 1889.

4. Letters patent of the United States No. 418,138, granted to John Stewart MacArthur on December 24, 1889.

5. Letters patent of the United States No. 576,173, granted to Henry Livingstone Sulman on February 2, 1897.

6. Letters patent of the Kingdom of Great Britain, No. 5,125, granted to Astley Paston Price, on October 29, 1883.

7. Letters patent of the Kingdom of Great Britain, No. 5,407, granted to Astley Paston Price, November 16, 1883.

8. Letters patent of the Kingdom of Great Britain, No. 10,223, granted to John Stewart MacArthur, Robert Wardrop Forrest and William Forrest, on July 14, 1888.

9. Letters patent of the kingdom of Great Britain, No. 14,174, granted to John Stewart MacArthur, Robert Wardrop Forrest and William Forrest, on October 19, 1887.

10. Letters patent of the kingdom of Great Britain, No. 1,978, granted to Alfred Paraf on the 1st day of August, 1866.

11. Letters patent of the Kingdom of France, No. 72,-466, granted to A. M. Paraf-Juval, by the Government of France on the 31st day of July, 1866.

12. And further answering said bill of complaint, this respondent avers that long prior to the supposed invention or discovery of the said Martin E. Waldstein claimed to be patented in and by said alleged letters patent No. 607,719, the same had been shown, indicated, and described in the following printed publications:

1. From and including page 239 to and including page 270, volume 1, of a certain book entitled "The Mineral Industry, Its Statistics, Technology and Trade in the United States and Other Countries from the Earliest Times to the End of 1892," printed and published at the city of New York, State of New York, in the year 1893.

2. At page 231 of a certain book entitled "The First Principles of Chemistry," by William Nicholson, printed and published at London, England, in the year 1796.

3. At pages 9, 14 and 58 of a certain book entitled "Instructions in Chemical Analysis," by Dr. C. Remigius Fresenius, printed and published at the city of London, England, in the year 1850.

4. At pages XXVI and 92, 93 and 185 of a certain book entitled "Outlines of Chemical Analysis," by Dr. Henrich Will, printed and published at Boston and Cambridge, in the State of Massachusetts, in the year 1855.

5. At page 461 of a certain book entitled "Electro-Deposition of Gold, Silver, Copper, Nickel, etc.," by Alex-

ander Watt, printed and published at the city of London, England, in the year 1889.

6. At pages 65, 77, 78, 88, 130 and 144 of a certain book entitled "The Art of the Electro Metallurgy," by G. Gore, LL. D., F. R. S., printed and published at London, England, in the year 1890.

7. At pages 10, 11, 13, 15, 30, 31, 32, 33, 34, 35, 36, 37, 53, 64, 70, 71, 76, 91, 107, 112, 113, 114, 115, 116, and 125, of a certain book entitled "Bulletin No. 5 of the California State Mining Bureau," having the subtitle "The Cyanide Process, Its Practical Application and Economical Results," by Dr. A. Scheidel, E. M., printed and published at the city of Sacramento, California, in the year 1894.

8. At page 147 of a certain printed periodical of general circulation entitled "The Engineering and Mining Journal," volume 54, No. 7, for August, 1892, printed and published at the city of New York, State of New York, in August, 1892.

9. At page 365 of the said last-named publication, printed and published at the city of New York, State of New York, in October, 1892.

10. At page 36 of a certain book entitled "Mixed Metals or Metalic Alloys," by Arthur H. Hiorns, printed and published at the city of London, England, in the year 1890.

11. At page 256 of a certain book entitled "A Treatise on Chemistry," by Henry E. Roscoe and C. Schorlemmer, part 1, volume 2, Metals, printed and published at the city of New York in the State of New York, in the year 1888.

12. At pages 540 and 560 of a certain book entitled "Elements of Metallurgy," by J. Arthur Phelps, printed and published in the city of London, England, in the year 1891.

13. At page 1134 of a certain book entitled "A Dictionary of Chemistry" (Supplement), by Henry Watts, printed and published in the City of London, England, in the year 1872.

14. At page 884 of volume 4 of a certain book entitled "Watts' Dictionary of Chemistry," by Henry Watts, printed and published in the city of London, England., and in the city of New York, New York, in the year 1894.

15. At pages 638, 1048 and 1049 of a certain book entitled "A Dictionary of Applied Chemistry," by T. E. Thorpe, printed and published in the city of London, England, and in the city of New York, New York, in the year 1890.

16. At page 161 of a certain book entitled "A Manual of Metallurgy," by William Henry Greenwood, printed and published in the city of London, England, and in the city of Glasgow, Scotland, in the year 1886.

17. At page 262 of a certain book entitled "A Complete Treatise on the Electro-Deposition of Metals," by George Langbien, printed and published at the city of Philadelphia, Pennsylvania, in the year 1891.

18. At pages 306, 307, and 317 and 319 of a certain book entitled "The Metallurgy of Gold," by T. Kirk Rose, printed and published in the city of London, England, and in the city of Philadelphia, Pennsylvania, in the year 1896.

19. At page 3116 of Division VIII of a certain book entitled "Spon's Dictionary of Engineering, Civil, Mechanical and Naval," printed and published by E. & F. N. Spon, in the city of London, England, and in the city of New York, New York, in the year 1874.

20. At page 5 of a certain printed periodical of general circulation entitled, "The Mining and Scientific Press," for July, 2, 1892, printed and published at the city of San Francisco in the State of California in July, 1892.

21. At page 1795 of volume 3 of a certain book entitled "Encyclopaedical Handbook of Technical Chemistry," by F. Stohman and Bruno Kerl, printed and published in the city of Braunschweig, Germany, in the year 1891.

22. At page 401 of a certain book entitled "A History of Chemistry," by Ernst Von Meyer, translated by George McGowan, printed and published at the city of London, England, and at the city of New York in the State of New York, in the year 1891.

22. And further answering said bill of complaint, respondent avers that it is informed that the said alleged invention was long prior to the supposed invention thereof by Martin E. Waldstein shown, indicated, and described in various and sundry other printed publications, and was patented in and by various and sundry other letters patent which are at present unknown to the respondent, and which when discovered and known re-

spondent prays may be inserted in this answer by appropriate amendment.

23. And further answering said bill of complaint, respondent avers that the said Martin E. Waldstein was not the original or first inventor or discoverer of any material or substantial part of the thing patented in and by his alleged letters patent numbered 607,719, but that the same was, prior to the supposed invention thereof by said Waldstein, known to and used by various and sundry persons whose names and places of residence are at present unknown to respondent, at various and sundry places throughout the United States, which are likewise unknown to respondent at the present time, but respondent prays that when it discovers the said names, residences and places, this answer may be amended by inserting the same herein in the manner and form prescribed by the statutes of the United States in that behalf made and provided.

And this respondent denies all and all manner of unlawful combinations and confederacy wherewith it is by the said bill charged; without this, that there is any other matter, cause, or thing in the said bill of complaint contained (material or necessary for this respondent to make answer unto, and not herein and hereby well and sufficiently answered, confessed, traversed, and avoided or denied) is true to the knowledge or belief of this respondent and of its officers; all which matters and things this respondent is ready and willing to aver, maintain, and prove as this Honorable Court shall direct; and it humbly prays to be hence dismissed with its reasonable costs and charges in this behalf most wrongfully sustained.

THE DE LAMAR MINING COMPANY, LIMITED,
Respondent.

By RICHARD H. JOHNSON,
Solicitor.

JOHNSON & JOHNSON and
JOHN H. MILLER,
Solicitors and Counsel for Respondent.

[Endorsed]: No. 177. United States Circuit Court, Ninth Circuit, District of Idaho. J. R. De Lamar vs. De Lamar Mining Co., Limited. Answer of Respondent to Bill of Complaint. Filed January 1, 1900. A. L. Richardson, Clerk. Johnson & Johnson, and John H. Miller, for Respondent.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Respondent.

Replication.

The replication of Joseph R. De Lamar, complainant, to the answer of the De Lamar Mining Company, Limited, defendant.

This repliant saving and reserving unto himself all and all manner of advantage of exception which may be had and taken to the manifold errors, uncertainties, and insufficiencies of the answer of the said defendant, for replication thereunto saith that he does, and will aver, maintain, and prove his said bill to be true, certain, and sufficient in the law to be answered unto by the said defendant, that the answer of the said defendant is uncertain, evasive, untrue and insufficient to be replied unto by this repliant; without this, that any other matter or thing whatsoever in the said answer contained, material or effectual in the law to be replied unto, and not herein and hereby well and sufficiently replied unto, confessed or avoided, traversed or denied, is true; all which matters and things this repliant is and will be ready to aver, maintain, and prove as this Honorable Court shall direct, and humbly prays as in and by his said bill he hath already prayed.

W. H. DICKSON,
A. C. ELLIS, and
A. C. ELLIS, Jr.,
Solicitors for Complainant and Repliant,

[Endorsed]: No. 177. Circuit Court of the United States, Ninth Circuit, District of Idaho. Joseph R. De Lamar Complainant, vs. The De Lamar Mining Company, Limited, Respondent. Replication. Filed February 3d, 1900. A. L. Richardson, Clerk. Dickson, Ellis & Ellis, Solicitors for Defendant.

In the Circuit Court of the United States for the District of Idaho.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.
} No. 177.

Praecipe for Appearance of Plaintiff.

To the Clerk of the Above-entitled Court:

You will please enter my appearance as solicitor in the above-entitled cause for the complainant.

A. G. SAFFORD.

[Endorsed]: No. 177. In the Circuit Court of the United States for the District of Idaho. Jos. R. De Lamar vs. The De Lamar M. Co., Limited. Praecipe for Appearance of Plaintiff. Filed and entered April 13, 1900. A. L. Richardson, Clerk.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant

Stipulation as to Taking Testimony.

It is hereby stipulated in the above-entitled case, as follows:

I. The complainant may take and file such evidence as it is advised on or before the 25th day of May, 1900.

II. The defendant may take and file such evidence as it is advised on or before the 1st day of September, 1900.

III. The complainant may take his testimony in rebuttal on or before the 25th day of September, 1900.

IV. A. L. Richardson is to be appointed a special examiner to take testimony at Boise City and vicinity. J. W. Christy, Deputy Clerk of the Circuit Court of the United States, is to be appointed a special examiner to take the testimony at Salt Lake and vicinity. ————————, is to be appointed a special examiner to take the testimony at Spokane and vicinity. ————————, is to be appointed a special examiner to take the testimony at Helena and vicinity, and ——————, is to be appointed a special examiner to take the testimony in the vicinity of San Francisco, and Hary S. W. Day, of Washington, D. C., is to be appointed a special examiner to take the testimony in Washington, Philadelphia, and New York. The testimony may be taken down by a stenographer to be selected by the several commissioners and afterwards reduced to typewriting.

V. Formal notice of the taking of the testimony is hereby waived, and shall be at such times and places as may be hereafter arranged by correspondence between the solicitors of the parties.

If the defendant concludes its testimony before the 1st day of September, 1900, then the complainant shall have thirty days after notice to that effect to complete its testimony in rebuttal, and the case is to be finally heard by the Court at the September term if it is then ready for hearing, or at some time to be fixed by the Judge, not later than the first Monday in December, 1900; it is the intention of the parties, however, to try the case in September. It is understood that the convenience of Mr. John H. Miller and of Mr. A. G. Safford, who are respectively of counsel is to be consulted with reference to all hearings.

Dated at Boïse City, this 13th day of April, 1900.

DICKSON, ELLIS & ELLIS,
Solicitors for Complainant.

JOHNSON & JOHNSON,
Solicitors for Defendant.

[Endorsed]: No. 177. In the Circuit Court of the United States in and for the District of Idaho Central Division. Joseph R. De Lamar, Complainant, vs. The De Lamar Mining Company, Limited, Defendant. Stipulation. Filed April 13th, 1900. A. L. Richardson, Clerk. Dickson, Ellis & Ellis, Solicitors for Complainant. John H. Miller and Johnson & Johnson, Solicitors for Defendant.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR, Complainant, vs. THE DE LAMAR MINING COMPANY, LIMITED, Respondent.	No. 177.

Amendments to Answer.

Amendment to the answer of the De Lamar Mining Company, Limited, Respondents, to the bill of complaint of Joseph R. De Lamar, Complainant.

Now comes the respondent in the above-entitled suit and by leave of Court first had and obtained, and by consent of the counsel for the complainant, makes and files this amendment to its answer on file in this case, to wit:

Immediately after paragraph 21, on page 12 of said original answer, insert the following:

"21½. And further answering the said bill of complaint, this respondent avers that long prior to the supposed invention or discovery of the said Martin E. Waldstein claimed to be patented in and by the said letters patent No. 607,719, the same had been shown, indicated, and described in the following printed publications, to wit:

"1. At page 268 of a certain printed publication entitled 'Industrie Blatter,' printed and published at the city of Berlin, in the empire of Germany, on August 23d, A. D. 1890.

"2. At page 375 of a certain printed publication, entitled 'Berg Und Huettenmaennischer Zeitung,' printed and published at Leipzig, in the empire of Germany, on October 17th, A. D. 1890.

"3. At pages 1618 and 1619 of Vol. 16, No. 87, of a certain printed publication entitled 'Chemiker Zeitung,' printed and published at Berlin, in the empire of Germany, on the 29th day of October, A. D. 1892.

"4. At pages, 155, 157, 162, 168, 170, 172, 173, 175, 183, 186, 197, 198, 201, 204, 214, 217, 218, 219, 225, 228, 235, 236, 246, 252, 254, 260, 276, 300, 324, 330, 335, 345, 347, 351, 360, 362, 363, 389, 391, of a certain printed publication entitled 'Fresinius Quantitative Chemical Analysis,' 3d edition, printed and published in the city of London, England, in the year 1860, by John Churchill.

"5. At page 529 and 531 of a certain printed publication entitled 'The Metallurgy of Silver and Gold and Metallurgy in the United States,' by Thomas Eagleston, Vol. 1, printed and published in the city of New York, in the year 1887.

"6. At page 151 of a certain printed publication entitled

'Roasting of Gold and Silver Ores and the Extraction of Other Metals,' by G. Kustel, printed and published in the city of San Francisco, California, in the year 1880.

"7. At page 338, volume 55, No. 15, of a certain printed publication entitled 'The Engineering and Mining Journal,' for April 15, 1892, printed and published at the city of New York, State of New York, in April, 1892.

"8. In number 22 of volume 51 for November 25, 1893, of a certain printed publication entitled 'The Engineering and Mining Journal,' printed and published at the city of New York, State of New York, in November, 1893.

"9. At page 121 of a certain printed publication entitled the 'Engineering and Mining Journal,' volume 54, No. 6, for August 6, 1892, printed and published at the city of New York, State of New York, in August, 1892."

Immediately after paragraph 23 on page 16 of said original answer, insert the following:

"24. The defendant says, upon information and belief, that while the application for the said letters patent in said bill mentioned was pending in the Patent Office of the United States, the applicant for the said patent, the said Martin E. Waldstein, so limited and confined the claims of the said application under the requirements of the Commissioner of Patents that he cannot now seek for or obtain a construction for such claims sufficiently broad to cover the process used by this defendant."

THE DE LAMAR MINING COMPANY, LIMITED,
Respondent.

By JOHN H. MILLER and
JOHNSON & JOHNSON,
Solicitors for Respondents.

[Endorsed]: No. 177. In Equity. In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central Division. Joseph R. De Lamar, Complainant, vs. The De Lamar Mining Company, Limited, Defendant. Amendments to Answer. Filed May 26th, 1900. A. L. Richardson, Clerk. By H. L. Richardson, Deputy. Messrs. Johnson & Johnson and John H. Miller, Solicitors and Attorneys for Respondent.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Respondent.

Stipulation Extending Time for Taking Testimony.

It is hereby stipulated in the above-entitled cause as follows:

I. The time given the respondent under the stipulation of April 13th, 1900, in which to take its testimony is hereby extended to the 1st day of October, 1900.

II. The time given the complainant under the said stipulation to take his testimony in rebuttal is hereby extended to the 25th day of October, 1900, and the said complainant may take such testimony in rebuttal at any time after the date of this stipulation and prior to conclusion of the time fixed for the respondent to conclude its testimony.

Dated this 6th day of August, 1900.

DICKSON, ELLIS & ELLIS,
Solicitors for Complainant.
JOHNSON & JOHNSON,
Solicitors for Respondent.

[Endorsed]: No. 177. United States Circuit Court, Ninth Circuit, District of Idaho. Joseph R. De Lamar, Complainant, vs. The De Lamar Mining Company, Limited, Defendant. Stipulation. Dated Boise City, August 6, 1900. Filed September 25th, 1900. A. L. Richardson, Clerk.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR, Complainant, vs. THE DE LAMAR MINING COMPANY, LIMITED, Respondent.	No. 177.

Stipulation as to Proposed Amendment to Answer.

It is hereby stipulated in the above-entitled cause, as follows:

That respondent's proposed amendment to its answer heretofore filed in the above-entitled cause, making two additional references, one to volume 31, No. 787 of the "Scientific American Supplement," for January 1891, and the other to volume 14, No. 17 (New Series), of "The Scientific American," for April, 1866, may be filed as a part of said answer and the articles referred to therein, the first upon the production of said "Scientific American Supplement No. 787," and the second upon the production of a photographic copy of said article from "The Scientific American, volume 14, No. 17 (New Series)" for April, 1866, may be filed and received in evidence upon the trial of said cause as part of respondent's testimony, without the necessity of a hearing before an Examiner to offer said articles in evidence; subject to the right of complainant to object to the reception of said articles or either of them, in evidence upon any legal grounds, upon the hearing, except the manner of their production in evidence and the fact the one of them is a photographic copy, which points are waived by complainant.

Dated September 24, 1900.

DICKSON, ELLIS & ELLIS,
Solicitors for Complainant.
JOHN H. MILLER and
JOHNSON & JOHNSON,
Solicitors for Respondent.

Let the amendment to respondent's answer in the foregoing entitled cause, described in the foregoing stipulation, be filed as an amendment of said answer; and the exhibits or articles mentioned in said amendment and in the foregoing stipulation be filed as part of respondent's testimony in said cause, in accordance with, and subject to, the conditions mentioned in said stipulation.

Boise, September 28, 1900.

JAS. H .BEATTY,
Judge.

[Endorsed]: No. 177. In Equity. In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho. Joseph R. De Lamar, Complainant, vs. The De Lamar Mining Company, Limited, Respondent. Stipulation and order. Filed September 28, 1900. A. L. Richardson, Clerk. John H. Miller and Johnson & Johnson, Solicitors for Respondent. Dickson, Ellis & Ellis, and A. G. Safford, Solicitors for Complainant.

In the Circuit Court of the United States Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Respondent.
No. 177.

Amendment to Answer.

Amendment to the answer of the De Lamar Mining Company, Limited, respondents, to the bill of complaint of Joseph R. De Lamar, complainant.

Now comes the respondent in the above-entitled suit, and by leave of the Court first had and obtained makes and files this amendment to its answer on file in this case, to wit:

Immediately before paragraph 22 of said answer, at the bottom of page 15 insert the following:

"And further answering said bill of complaint, this respondent avers that long prior to the supposed invention or discovery of the said Martin E. Waldstein, claimed to be patented in and by the said letters patent No. 607,719, the same had been shown, indicated and described in the following printed publications, to wit:

"23. A printed article entitled 'The Recovery of Silver and Gold from Plating and Gilding Solutions,' on page 12,582 of a certain printed publication of general circulation entitled 'Scientific American Supplement,' volume 31, No. 787, printed and published at the city of New York, State of New York, in January 1891.

"24. A printed article entitled 'To Recover Gold From Solutions' under the heading 'Correspondence,' on page 260 of a certain printed publication of general circulation entitled 'The Scientific American,' volume 14, No. 17 (New Series), printed and published at the city of New York, State of New York, in April, 1866."

THE DE LAMAR MINING COMPANY, LIMITED,

Respondent.

By JOHNSON & JOHNSON and

JOHN H. MILLER,

Of Counsel and Solicitors for Respondent.

[Endorsed]: No. 177. In Equity. Circuit Court of the United States, Ninth Circuit, District of Idaho, Central Division. Joseph R. De Lamar, Complainant, vs. The De Lamar Mining Company, Limited, Respondent. Amendment to Answer. Filed September 28th, 1900. A. L. Richardson, Clerk. John H. Miller and Johnson & Johnson, Solicitors for Respondent.

In the Circuit Court of the United States Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.
} No. 177.

Final Decree Dismissing Bill.

This cause having come on to be heard the 18th day of April, A. D. 1901, upon pleadings and proofs, and Mr. A. C. Ellis, Sr., and Mr. A. C. Ellis, Jr., having been heard on the part of the complainant, and Mr. J. H. Miller and Mr. R. H. Johnson, on the part of the defendant, and due deliberation having been had, it is ordered, adjudged, and decreed that the complainant's bill of complaint be, and the same is hereby, dismissed, with costs to the defendant to be taxed.

August 31st, 1901.

Costs taxed in the sum of $368.70.

JAS. H. BEATTY,
Judge.

[Endorsed]: No. 177. United States Circuit Court, Central Division, District of Idaho. Joseph R. De Lamar, Complainant, vs. The De Lamar Mining Company, Limited, Defendant. Final Decree Dismissing Bill. Filed August 31st, 1901. A. L. Richardson, Clerk.

In the Circuit Court of the United States, Central Division, District of Idaho.

JOSEPH R. DE LAMAR,
vs.
THE DE LAMAR MINING COMPANY, LIMITED
} No. 177.

Clerk's Certificate to Judgment-Roll.

I, the undersigned clerk of the Circuit Court of the United States for the District of Idaho, do hereby certify that the foregoing papers hereto annexed constitute the judgment-roll in the above-entitled action.

Witness my hand and the seal of said court affixed at Boise, Idaho, this 31st day of August, A. D. 1901.

[Seal] A. L. RICHARDSON,
Clerk.

[Endorsed]: In the Circuit Court of the United States for the District of Idaho. Judgment-roll No. 177. Joseph R. De Lamar, Complainant vs. The De Lamar Mining Company, Limited, Defendant. Register No. 1. Filed August 31, 1901. A. L. Richardson, Clerk.

In the Circuit Court of the United States, for the District of Idaho.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.

Opinion.

The complainant, the owner of patent No. 607,719, issued July 19, 1898, "For a process of recovering precious metals from the solution," brings this action against the defendant as an infringer.

As gathered from the record of this case the process known as the cyanide process for separating the precious metals from the ore state consists of pulverizing the ore and then subjecting it to an aqueous solution of cyanide of potassium. The pulverized ore and this solution being mingled, the cyanogen an element in the solution, having a greater affinity for the gold and silver than for the potassium, unites with the former and forms a new solution.

By subjecting this last solution to contact with zinc, the gold and silver are separated from the solution. Such was, and is, the general process.

The complainant's contention is, that under the only processes in existence prior to his patent, zinc in some massive form, as in plates, shavings, etc., was used; that to mechanically, reduce the zinc to any of these forms, was a considerable expense; that it was not in any of these forms so minute that all of it would be reached by the solution, and as a result an amount of zinc beyond that actually needed to precipitate all the metal was necessarily used, which resulted in so fouling the solution with zinc, that to some extent, it was rendered unfit for future use; that it required much time to work the ores by this process, and that prior to his patent there was no process by which each particle of the necessary amount of zinc could be brought into contact with each atom of the precious metal contained in the solution, which he claims, is done by the process described in his patent, and through which all the difficulties referred to in the prior processes are avoided.

The patent specifies that it "relates to the recovery of the precious metals from their solutions by the use of a definite quantity of a finely divided precipitating reagent in a state of agitation"; that the zinc alloys, shavings, turnings, etc., heretofore used, had to be used in excess of the quantity actually required for precipitation; that the by-product known as zinc dust, being a very fine powder, resulting from the manufacture of zinc products, is a cheap substitute which can be used in the exact quantity which the solution may require for precipitation, for the use of which, with agitation, the claims provide.

The chief improvement claimed by the patent, over prior processes, is that by the use of zinc dust, with agitation of it with the solution, it can be used in the exact quantity needed for precipitation, thus so avoiding the fouling of the solution with a surplus of zinc, that it can again be used.

If the Court does not reach the correct result in the consideration of this cause, it will not be from want of either ability or diligence upon the part of counsel, for each party has been ably and faithfully represented. If the Court does not, in its discussion of the issues, refer to all of the questions and details represented by counsel, it is no reflection upon their judgment.

In this examination we start with the presumption in favor of the validity of the patent, which is but the logical conclusion of its issuance. This presumption, however, is but prima facie evidence, and is not of such conclusive weight as to sway the judgment of the courtagainst the conviction naturally following from the evidence and the law. We are justified in concluding this presumption is not controlling when we consider the great number of patents that the Courts hold void. Either the Courts or the Patent Office often err. The system as it is, certainly is vicious—almost, it seems; the practice is to issue patents, and leave the Courts to wrestle with the question of their validity, thus affording ample opportunity for the display of erudition upon technical subtilities at the expense and cruel disappointment of unfortunate patentees and litigants.

As understood by the Courts, the claim of the patent is for more than claimed or than can be, by complainant. The third claim seems to include the entire process of extracting the precious metals from their ores: 1. Subjecting the ores in a pulverized state to the action of an aqueous solution of cyanide; 2. Supplying to such solution the zinc dust; 3. The agitation of the solution and the zinc dust; and 4. Recovering the precious metals from the precipitate resulting from the prior steps. Undoubtedly the first and last of these steps are old processes and are not the invention of the patentee. The second and third are all, as is understood, that are claimed by complainant, or that can be within the protection of the patent. The important question then is, whether within the law, these constitute an invention by the patentee, and whether they are useful. What were the conditions, the state of the art, when the patentee commenced his investigations, and what changes or improvements did he make? Long before he commenced such investigations, it was well known and was in daily practice, that zinc was a valuable metal for the precipitation of the precious metals from a cyanide solution; in fact it was the metal alone used in such solutions. It was also discovered that this precipitation was increased as the surface of the zinc used was increased. As with a given amount of zinc the surface would be increased as it should be divided into a geater number of parts, it resulted that the finer the particles of zinc the better it operated by bringing it into contact with more of the solution carrying the metals. It followed that instead of using the sheet of bar zinc, shavings, granules, and other forms of comminuted zinc were substituted. These different forms of zinc were used in different ways, but probably the most approved, was to so pass the solution over a body of such zinc as that it could percolate through it. To even this there was the objection that it required more zinc than could be actually used, much of it not being reached by the solution. Also to prepare zinc in the form found best was an item of considerable expense, as it had to be specially prepared for that purpose. It resulted that at the time the patentee, Waldstein, commenced his experiments, it was well established that zinc was the metal for this use, and that the finer it could be made, or the more surface that could be had for a given quantity of it, the better the results. There is no question that at this time zinc dust or zinc fume was a well-known article of commerce, and there is evidence that efforts had been made to use it for the precipitation of the precious metals, but when used in large bodies of the solution, it was found to sink to the bottom of the vessel, or if the effort were made to percolate the solution through it, it so clogged as to be impracticable, and was pronounced a failure. There is no evidence that it was being used in a mill or in large operations until so used by Waldstein. This zinc dust is the most minute form to which zinc can be reduced—it is a powder. It fully meets the desirable object of presenting the most possible surface with a given amount of zinc. It is also cheap, being but a by-product from other operations. By being well mingled with the solution carrying the metals, it comes in contact with every part of the solution, thus precipitating more of the metals with the same amount of the zinc than in any other form that it can be used. It was an improved form over that before used, but of course as the patentee did not invent the form, he can, and does not, claim any rights for that, but he claims for the discovery and application of its use. Another difficulty confronted him, and those who had attempted its use; being in such a fine powder it readily packed or clogged when put into a solution, or when the attempt was made to percolate a solution through it. It can readily be seen how this would result, and that with this difficulty in the way, it would not be as valuable as zinc shavings, or other forms of zinc which would not pack into a solid mass. This difficulty was overcome by Waldstein by such agitation of the solution and zinc dust, as that the whole mass would be kept in motion and thoroughly commingled—a very simple thing, it seems, but the only thing that made the zinc dust a most valuable precipitant instead of a failure. So what Waldstein did was to use zinc dust and so put it in motion that it could be used. If in this there was invention, it was chiefly in the principle of agitation. It cannot be doubted that with certain ores at least it was an improvement over former processes and that it is useful. That it is of the great utility claimed is not shown by the facts, for while it appears to be now used in several places, it also appears that it has not entirely supplanted the former process which still seems to be successfully used.

An objection made to the patent is that the process described therein cannot be followed with any beneficial result; hence its lack of utility. The claim is that it provides for the use of only the exact amount of zinc dust necessary to precipitate the metal in the solution, the result of which would be that the dust, being all used in the process of precipitation, there being in the solution an excess of cyanide, the process of a redissolution of the precious metals, would immediately begin, by reason of the great affinity between them and the cyanide. It is claimed that an excess of zinc dust must always be used, and the evidence shows that such is the practice, even with those who adopt the process under this patent. Of the expert witnesses who have testified upon this subject, some say the directions of the patent cannot be successfully carried out, while others say its proper construction removes all difficulty. The statute, section 4888, says that the applicant for patent shall file in the patent office a written description of his discovery, "of the manner and process of making, constructing, compounding, and using it in such full, clear, concise and exact terms as to enable any person skilled in the art or science, to which it appertains * * * to make, construct, compound and use the same." The patent, to me, unskilled in the art, would seem to direct that exactly the amount and no more of the dust needed to precipitate the metal, should be used. It directs the use of a "definite" quantity—the exact quantity which the solution may require. It is argued by the complainant that to one skilled in the art this means only that amount which is necessary to properly precipitate the metals and retain them in such precipitated state, which implies a slight excess over the exact amount needed for actual precipitation. Definite quantity may mean the certain amount needed in each case as distinguished from an indefinite, and unlimited, or any amount as was used in the older process; that the amount must be gauged by the actual necessity as shown by proper calculation instead of using by mere guess any indefinite amount. Certainly a specified amount cannot be named in the patent for all cases, for it must vary according to the nature of the ores and solution. While a very strict construction of the language of the patent might lead to the conclusion that it intended to specify that only the actual amount needed for precipitation should be used, yet I think a liberal construction should be placed upon it, and with that view, I think one acquainted with the business of working ores, could, from the description in the patent, follow it to a successful operation. If this is so, the patent conveys such a practical description of the process as brings it within the intent of the statute. While the patent might have been safely made more explicit, I doubt that this defect is of such gravity as to render it wholly void.

Another objection made is, that this patent is but the application of an old process to a new use, or as denominated in the patent law, a double use. For the law upon this question, reference need be made only to the case of the Lowell Manufacturing Company vs. Cary, 147 U. S. 623, wherein not only is there a full discussion of the law, but the authorities are collated. The patent in that case was concerning the tempering of coiled steel springs used in the construction of furniture. The Court says: "The claim limits the method to its application to 'furniture or other coiled springs'; but it appears from the evidence that the process as applied to those springs is in no respect different in method or effect from the same process when applied to any mechanically strained wire, or to steel made in straight pieces or strips or otherwise. The claim covers broadly the described method of tempering applied to any coiled springs as well as coiled springs for furniture, and if the evidence shows that prior to Cary's invention, the method had been used for the restoration of any springs of strained steel or other articles of strained steel, having resiliency, which is a well-known property of steel, the claim is substantially anticipated. Particularly if the method claimed has been used by others to restore articles of coiled spring steel, even though they were not used for furniture springs, the claim is anticipated." Again: "It is clearly shown by the witnesses for the defendant that prior to Cary's alleged invention, wire clock-bells and hair-springs had been subjected to heat in the manner described in the Cary specifications and with the same bluing effect. The treatment to which the articles were subjected was in all respects the same in the prior use as in the patented process. The only contention of the plaintiffs is that the purpose of the prior use was not the same, and that the results, so far as they were those of the patent, were accidental." Also, "in Smith vs. Nichols, 21 Wall. 112, it was held that a mere carrying forward, or new or more extended application, of the original thought, a change only in form, proportions, or degree, the substitutions of equivalents, doing substantially the same thing in the same way, by subtantially the same means, with better results, as not such invention as would sustain a patent; and in Roberts vs. Ryer, 91 U. S. 150, it was held that it was no new invention to use an old machine for a new purpose, and that the inventor of a machine was entitled to the benefit of all the uses to which it could be put, no matter whether he had conceived the idea of the use or not"; and the Court, after citing numerous authorities, says: "The principle deducible from those cases is that it is not a patentable invention to apply old and well-known devices and processes to new uses in other and analogous arts." As will be seen, the chief object of the patent was for the tempering, by heat, of coiled steel springs used in the construction of furniture, but the Court held that it was anticipated by any prior process for tempering any other kind of springs used for any other purpose, but particularly refers to the springs used in clocks, and held the patent void. Let us now apply the law of this case to the facts in the cause here. The United States issued February 25, 1868, its patent to Bischof & Kidwell for "improvements in preparing finely divided iron and the separation of copper, silver and other metals from their solutions." It describes the process of making iron powder from oxides of iron powder and the solutions, and then describes a revolving cask, in which are certain slats, or partial partitions for thoroughly mixing the solution as the cask is turned on its axis, and says that the copper is precipitated almost instantaneously. The claims of this patent also include the "precipitation of metallic copper from its solutions by the use of finely divided iron, and the use of finely divided metallic copper * * * for separating silver from its solutions." Patent No. 5,407, issued November 16, 1883, by the United States to Astley P. Price, "for obtaining copper from cupreous solutions," specifies that it is for the "precipitation of the copper from its solution or solutions, by the employment of zinc when in a state of fine division, such, for example, as that which is known as zinc fume or the condensated vapor of zinc. In carrying out my invention, I add to the solution or solutions, containing copper, zinc in a state of fine division, such as zinc fume, which is substantially metallic zinc in a state of fine division, and I cause the cupreous solution or solutions to be intimately mixed with the same, either by the injection of steam or of air, or by a mechanical agitation, in order that the copper existing in solution may be precipitated therefrom." Without suggestion, it is evident that the process here described is the same as in the Waldstein patent, using the zinc dust or fume, and mechanical agitation, but for the precipitation of copper instead of gold or silver. The Waldstein patent is but the application of this process to a new use—that is, for the precipitation of gold and silver instead of copper. To the same general effect is Defendant's Exhibit No. 9, the French patent to Messrs. Paraf-Juval, issued July, 1866. I am unable to see why the facts shown by these patents do not bring this case within the rule established by the United States case above cited.

The law intends to protect by patent only those who actually invent—those who discover and give to the world something that was unknown, and not to confer upon a claimant that which he merely adopts from the suggestion and the genius of others. Accordingly, the statute provides by section 4886, that: "Any person who has invented or discovered any new and useful art * * * or any new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale, for more than two years prior to his application, * * * may * * * obtain a patent therefor." The defendant, in support of its claim that under this provision of the law, the patent is void, has introduced a number of domestic and foreign patents and publications, a part of which, including those already referred to, will be noticed. Defendant's Exhibit No. 8, English patent No. 18,146, granted to Sulman August 17, 1895, is for the recovery of the precious metals from cyanide solutions by the use of zinc in an "extremely fine state of division." The patentee says he finds the best form of zinc for use is where it is obtained by "condensation from the metallic vapors given off in the distillation of zinc, say, for example, the product from the flues and settling chambers." In the claims of the patent zinc dust or fume is named. The American patent to the same party, for which application was made February 25, 1895, and granted February 2, 1897, No. 576,173, refers to the use of metallic zinc vapor, generally known as zinc dust or fumes. In connection with the question discussed in this case, as to the value of zinc oxide, it may be noted that in this patent a part of the process described consists in "purifying the fumes or dust of zinc of oxides." This patent includes the use of zinc dust purified of its oxide, and the agitation of its mixture. Defendant's Exhibit No. 11 is the United States Patent No. 5,125, to Astley Paston Price, October 29, 1883, which is for the "Extraction of the precious metals from their ores and from compounds, etc." It provides for the use of zinc or other metals than copper in a state of fine division, and for the agitation of the mixture, either by the injection of steam, air, or by mechanical means. In the subsequent patent to the same party, and above referred to No. 5,405, it is added to his specifications that the zinc dust used is that which is known as zinc fume or the condensed vapor of zinc. The last patent, however, refers to the precipitation of copper. Among the publications referred to are Defendant's Exhibit No. 20, a German publication, published at Leipzig, October 17, 1890, describing the process for the recovery of silver and gold from cyanide of potassium solutions in which it is stated that "for precipitating gold, agitate the mixture with zinc dust." Defendant's Exhibit No. 19 is also a German publication, published at Berlin, August 23, 1890, for "The recovery of silver and gold from used cyanide of potassium liquids," in which the use of zinc dust shaken or stirred is described. This article is republished in the Scientific American Supplement, at New York, January 31, 1891. Defendant's Exhibit No. 21 is another German publication of October 29, 1892, in which it appears that gold may be recovered from cyanide of potassium liquids, with the aid of zinc dust, by repeated shakings. These various patents and publications clearly show that long prior to complainant's patent the process claimed by it was substantially described. It has been argued that the zinc dust named in some of these exhibits was not the article referred to in complainant's patent, but the suggestion is not well supported. Not only was it a well-known article, but in some of the exhibits it was especially described. Moreover, when an article has a known name, why, when that is used, can there be any reason to conclude that something else is meant? Were this the rule, surely there could be nothing in a name. It need scarcely be added that it is immaterial whether or not the patentee knew of these publications, but some of them were made at his own home. The law, however, only provides for the fact of publication, and not for the knowledge of it. Many authorities, in the argument of this case, have been cited, apparently pointing to different conclusions. When all the facts concerning them, and the peculiar questions appertaining to the patent law, are fully considered, the probabilities are that they are consistent with each other, but it may be doubted that it is the province of this trial court, after having carefully examined, to undertake here, to fully review them.

The authorities cited by complainant concerning foreign publications are to the effect that they must be so full and clear, as to enable any person, skilled in the art or science, to which they appertain, to practice the invention to the same practical extent as they would be enabled to do if the information were derived from a prior patent. These publications seem to me, to be so similar to the specifications of the patent, that one skilled in the art would readily reach the latter from the suggestions of the former.

After a most careful and laborious examination of this cause, being convinced that the complainant's patent is subject to the defenses that it is an old process applied to a new use, and that it is anticipated by prior publications and patents, without further discussions of the other questions raised, the conclusion is, that a decree be and is ordered for defendant, with its costs.

In the absence of counsel, some of whom reside at a distance, forty days' time is given them after notice of this decision, in which to take such further steps in the cause, as any of them may desire.

Dated at Boise, Idaho, August 23, 1901.

BEATTY,

Judge.

[Endorsed]: No. 177. United States Circuit Court, District of Idaho. Joseph R. De Lamar vs. De Lamar Mining Company, Limited. Opinion. Filed August 24th, 1901. A. L. Richardson, Clerk.

In the Circuit Court of the United States, for the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR, vs. THE DE LAMAR MINING COMPANY, LIMITED.	}

Deposition of David K. Tuttle.

(Before Laura V. Whitcomb, Notary Public, at Philadelphia, in the State of Pennsylvania, March 6th, 1900.)

Appearances.

For the Complainant, A. G. SAFFORD.

For the Defendant, EDWIN H. BROWN.

David K. Tuttle, a witness produced, sworn, and examined on behalf of the complainant, testified as follows:

(It was orally stipulated in open court by counsel for both parties; that the testimony might be taken down in typewriting; and to be submitted afterwards to the said witness and then subscribed and sworn to, and to be of the same effect as if wholly completed in the presence of counsel.)

Prior to the commencement of the examination of the witness, Mr. Edwin H. Brown, counsel on behalf of the defendant, seasonably objects to the taking of the deposition of this witness or of any other witness under the notice

(Deposition of David K. Tuttle.)

served, on the ground that this is not a proper case for the taking of depositions de bene esse, and not within the provisions of the de bene esse statute, as provided by Congress for the taking of depositions de bene esse.

Direct Examination.

Question 1. (By Mr. SAFFORD.) What is your name, age, residence, and profession?

A. David K. Tuttle; I am 64 years of age; residence, Philadelphia; Chemist by profession. Present occupation, melter and refiner at the United States Mint, Philadelphia. I have been in the employ of the United States for about fourteen years.

Q. 2. What has been your education and experience as a chemist?

A. Graduate of the Lawrence Scientific School at Harvard University, and of the University at Guttingen; taught chemistry for five years at the University of Virginia, and since have been engaged in metallurgical and chemical pursuits generally.

Q. 3. Are you somewhat familiar with the process of precipitating the values from cyanide solutions, charged with the precious metals? A. I am.

Q. 4. How has this precipitation been usually accomplished as a commercial proposition?

A. By metallic zinc in some comminuted or coarsely powdered condition. The solution is usually filtered through such a zinc medium.

Q. 5. In what form has it usually been practiced?

A. Usually zinc turnings have been used.

(Deposition of David K. Tuttle.)

Q. 6. In what manner has the zinc been presented to the solution? How disposed?

A. It is placed in troughs over which the solution is allowed to flow.

Q. 7. What are the principal objections to this method of precipitation?

A. It requires a very large mass of zinc to obtain the active surface which causes the precipitation; this leaves a considerable excess of zinc to be eliminated before you recover your precious metals.

Q. 8. If zinc is used in this quiescent state, is there any difficulty arising from the decomposition of the solution and the accumulation of hydrogen on the surface of the precipitant? If so, explain it.

(Objected to as leading, and suggestive of the answer.)

A. Hydrogen is not likely to be evolved when gold cyanide solution is contact with a particle or piece of zinc. When a portion of the solution is exhausted of its gold, the action of the zinc continues as hydrogen collects upon the zinc. If, then, the solution be not uniformly distributed over the zinc, hydrogen will collect on the zinc and prevent contact of the active solution with it. Hence the desirability of some form of agitation which will prevent this occlusion or deposition of hydrogen.

Q. 9. What is the mechanical difference between the zinc dust and mechanically subdivided zinc?

A. An enormously greater surface on the part of the zinc dust. I know of no way by which zinc can be mechanically pulverized so as to approach the surface presented by zinc dust. By mechanically powdering you

(Deposition of David K. Tuttle.)

can approach the great surface presented by zinc dust, but the gap is a very great one between them.

Q. 10. Of what is zinc dust composed?

A. Almost exclusively of metallic zinc and zinc oxides.

Q. 11. What is your understanding generally of the Waldstein process?

A. The salient features, as I understand them, are that he used a definite, predetermined quantity of zinc dust bringing it in contact with the solution by agitation, rather than by filtration.

Q. 12. Please state whether in your opinion that method is an advantageous one as compared with zinc in other forms, and if you answer that it is. Please state the reasons which occur to you why it is more advantageous?

(Objected to for the reasons that the witness has not yet been shown qualified to give such a statement.)

(Question waived for the present.)

Q. 13. Are you familiar with the use of cyanide as a solvent for gold?

A. I think I can say truthfully, yes, but never on a large scale. I am in touch with all the quoted results the various improvements that have been offered to the public, chiefly through the voluminous scientific literature.

Q. 14. Have you made and used such solutions?

A. I have. I have made applications for patent for the improvements in the use of cyanide solutions for the extraction of the precious metals.

(Deposition of David K. Tuttle.)

Q. 15. Have you ever practiced the process of recovering the precious metals from their cyanide solutions?

A. Not out of the laboratory. I have in the laboratory.

Q. 16. Now, please answer my question No. 12, asked you before.

(Objection repeated; it has not been shown that the witness has ever used Waldstein's alleged method, or any other, so that he is qualified to make a comparison.)

A. The first advantage which occurs to me is, that the action is very much more rapid, due to two causes; one, the increased surface of the zinc dust; and, second, to the fact that the dust is in such fine state of division, that it may be brought in contact with the entire solution by agitation; again, the very much less quantity of zinc which will accomplish the purpose—in fact, the zinc may be almost entirely consumed and the precious metals recovered in a much more concentrated state.

Q. 17. Would it be pratical in the use of zinc in its more massive forms, to predetermine the amount necessary for precipitation?

(Same objection.)

A. I should say not, since in the very nature of the process, a larger excess of zinc must be present if it rests quietly, over which the solutions flow; otherwise your precipitation is incomplete.

Q. 18. How would it be in case of the agitation of zinc filings or other mechanically divided zinc, with reference to predetermining the quantity to be used?

(Deposition of David K. Tuttle.)

(Same objection. It does not appear that the witness has ever made experiments in this line.)

A. If the agitation of zinc filings can be practically effected the quantity required might be predetermined. The time required to predetermine the quantity and to effect the precipitation by such predetermined quantity of zinc filings, would render the process practically useless—that is if the predetermination is to serve any purpose.

Q. 19. As to the capacity of zinc dust on the one hand, and zinc filings on the other favorable to the dispersion of either in the solution, which is the more floatable.

(Same objection.)

A. The zinc dust, owing to its greater state of division, would be more easily kept in suspension in the solution by the agitation of the liquid.

Cross-Examination.

(By Mr. EDWIN H. BROWN, without waiving any objections.)

XQ. 20. What have you meant by "zinc turnings," as used in your examination?

A. I understand it to be made by placing a massive piece of zinc in a lathe and turning off fine, more or less spiral—chips of a spiral form.

XQ. 21. You have spoken of its use and of what you term "the principal objections to its use"; how do you know such objections exist?

(Deposition of David K. Tuttle.)

A. Through the reading of the difficulties, and the attempts made to obviate them.

XQ. 22. Attempts made by whom?

A. By electricians by attempts to substitute electrolysis for zinc, that is one.

XQ. 23. Then your statements are not based upon experiments of *my* own?

A. No, not from experiments of my own.

XQ. 24. This answer will apply to all your statements, relating to the precipitation of precious metals from cyanide solutions by the use of zinc, will it not?

A. I should have to recall whether I made any statements—practically, yes, my answers were based on my knowledge of the subject as gained from the literature on the subject, and practical contract with men who were engaged in the operation; in fact, my knowledge of the subject as you must have seen, is very largely that of a chemist who, from his interest in metallurgical subjects, has endeavored to keep touch with all metallurgical processes.

XQ. 25. Then when you speak of advantages in the use of what you have defined as the Waldstein process, you depend upon your knowledge of the art as gained from the literature that is, publications, do you not?

A. I do not. From my long experience in metallurgical operations, I can see the advantages or disadvantages of a metallurgical operation; in other words, I can arrive at a judgment on it, without having actually worked it myself.

(Deposition of David K. Tuttle.)

XQ. 26. Explain how your metallurgical experience enables you to arrive at this conclusion.

A. I have precipitated solutions with metal in a more or less massive state; I have precipitated it with the same metal in a very finely divided form. Common sense tells me that what is true in this case is true in another parallel case.

XQ. 28. I do not quite understand the latter part of your answer: What is true in the one case that follows in the other.

A. I will explain by illustrating. I have precipitated gold from its solution with sheets of copper, but in a very much less time and much more effectively, by what is called cement copper, being practically copper dust. If I had gold to precipitate with sheet zinc, I should treat it as a "parallel case" preferably with zinc dust.

XQ. 29. You mean, I suppose, that if the copper dust is more effective in the one case, zinc dust will be more effective in the other?

A. The two reactions being so similar in character, that I should certainly expect the zinc dust to be as superior to the zinc sheet, as the copper dust was to the copper sheet.

XQ. 30. When, to your knowledge, was copper dust used as a precipitant for gold in solution?

A. I have never known it to be used on a large scale.

XQ. 31. Do you mean you have no personal knowledge of the fact in distinction to publications of its use?

A. Don't know of its use from either source.

(Deposition of David K. Tuttle.)

XQ. 32. Why is it zinc turnings are used in the precipitation of gold from solutions instead of sheets of zinc?

A. The reason, as I understand it, is the increase of surface, an attempt in other words, to approach as near as they can, a greater state of division, as the action is purely a surface one.

XQ. 33. That is to say, the greater the exposed surface of the zinc, the greater the precipitation of the precious metal?

A. The more rapid and complete the precipitation of the precious metal.

XQ. 34. This has been known to the art a great many years, hasn't it? A. It has.

XQ. 35. For how long, to your knowledge?

A. So far as I know, as far back as one metal has been used to precipitate another. The only improvements that I know to have been made were in the direction of getting a still finer state of division, than was previously known.

XQ. 36. What is "copper dust," is it powdered copper?

A. It is not; it is copper precipitated from solution usually by iron or zinc dust; it has then very much the effective action as a precipitant that zinc dust has, being an almost impalpable powder.

XQ. 37. To your knowledge in the metallurgical art in the use of a precipitant in solutions containing metals it has for a good many years been common to in some way, agitate the precipitant, has it not?

(Deposition of David K. Tuttle.)

A. It has always been considered desirable, where there were no insuperable mechanical difficulties.

XQ. 38. For how many years has this been the case?

A. From time immemorial I should say.

XQ. 39. Why has it been desirable to agitate the precipitant, and why has it been done?

A. It is desirable in order to bring the two reacting substances into immediate contact and maintain that contact action.

XQ. 40. What is the result when the precipitant is not agitated?

(Question objected to because it does not specify the kind of solution or the kind of precipitant and is misleading and obscure.)

A. The local action of the precipitant on the solution soon ceases, and any further action must depend upon the solution coming to the precipitant by change of gravity, temperature or some other similar cause, the final result being a much retarded action.

XQ. 41. How many applications for patents for improvements in the cyanide solutions have you made?

A. Only one, and that had no relation to the method of precipitation.

XQ. 42. For how long a period, to your knowledge, has one metal been used to precipitate another?

A. That goes beyond my memory, before my time I think.

XQ. 43. Do you mean in this country?

A. Anywhere in the world, including America.

DAVID K. TUTTLE.

(Deposition of David K. Tuttle.)

State of Pennsylvania, }
County of Philadelphia. } ss.

On this 6th day of March, A. D. 1900, before me, Laura V. Whitcomb, notary public, appeared David K. Tuttle, and being by me first duly sworn did depose and say as above written and by him subsequently signed; and also that the deposition so given by him contained the truth, the whole truth, and nothing but the truth.

Witness my hand and notarial seal.

[Seal] LAURA V. WHITCOMB,
Notary Public.

State of Pennsylvania, }
County of Philadelphia. } ss.

I, Laura V. Whitcomb, a notary public within and for the State of Pennsylvania, residing in the city of Philadelphia, hereby certify that on the 6th day of March, 1900, by agreement of parties, at room No. 505, No. 1001 Chestnut street, Philadelphia, Pennsylvania, at 11 o'clock A. M., was produced and personally came before me as such notary public, David K. Tuttle, a witness on behalf of the complainant to depose in a certain civil cause depending in the Circuit Court of the United States (Ninth Circuit), sitting in equity for the District of Idaho, wherein Joseph R. De Lamar is the complainant and the De Lamar Mining Company, Limited, is the defendant, and whose testimony is alleged to be competent and material, in said civil cause on behalf of the complainant.

(Deposition of David K. Tuttle.)

The cause for taking said deposition is the fact that the said witness resides more than one hundred miles from the place of trial of said cause, and more than one hundred miles from any place at which a Circuit Court of the United States for the District of Idaho is appointed to be held by law.

This deposition being taken in accordance with the annexed citation, the adverse party was duly notified and attended the taking of said deposition, by counsel. The complainant was represented by A. G. Safford, and the defendant by Edwin H. Brown.

The said David K. Tuttle was by me carefully examined, cautioned, and duly sworn, according to law, to testify the whole truth touching the matter in controversy, and did depose and say as hereinabove written down.

I am not of counsel for either of said parties, or interested in the event of said cause.

In testimony whereof I have hereunto set my hand and notarial seal this 6th day of March, 1900.

[Seal] LAURA V. WHITCOMB,
Notary Public.

Notary Fees:

Attendance	$5.00
Writing deposition	$5.10
Certificate	$1.00

(Deposition of David K. Tuttle.)

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.

Notice as to Taking Deposition of David K. Tuttle.

Please take notice that the complainant herein will take the testimony of David K. Tuttle, who resides in the city of Philadelphia, State of Pennsylvania, and others, all of whom reside more than one hundred miles from the place of trial herein, and more than one hundred miles from any place at which a Circuit Court of the United States for the District of Idaho is appointed to be held by law, at the final hearing for use on behalf of the complainant, before L. V. Whitcomb, a notary public within and for residing in the said city of Philadelphia, and who is not of counsel nor interested in this cause, at the office of said clerk in postoffice building at 9th and Chestnut streets, in said city of Philadelphia, in said State of Pennsylvania, on the 2d day of March, 1900, at 10 o'clock A. M., and thereafter from day to day as the taking of the depositions may be adjourned; and such testimony will be taken in accordance with the provisions of

(Deposition of David K. Tuttle.)

sections 863, 864, and 865 of the Revised Statutes of the United States and the Equity Rules.

Dated at Salt Lake City, Utah, February 3d, 1900.

DICKSON, ELLIS & ELLIS,

Solicitors for Complainant.

To Messrs. Johnson & Johnson, and John H. Miller, Solicitors for Defendant.

Service of the within notice admitted this fifth day of February, A. D. 1900.

Boise, Idaho, February 5th, 1900.

JOHNSON & JOHNSON,

Solicitors for Respondent.

The time of taking this deposition of D. K. Tuttle is hereby changed by mutual agreement to 11 A. M., March 6th, and as to place to room 505-1001, Chestnut street, Philadelphia.

A. G. SAFFORD,

Solicitor for Complainant.

EDWIN H. BROWN,

Solicitor for Defendant.

[Endorsed]: In Equity. Joseph R. De Lamar vs. The De Lamar Mining Company, Limited. Deposition of David K. Tuttle. Filed March 10th 1901. A. L. Richardson, Clerk.

(Deposition of Martin E. Waldstein.)

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.

Notice as to Taking Deposition of Martin E. Waldstein.

Please take notice that the complainant herein will take the testimony of Martin E. Waldstein, who resides in the city of New York, and State of New York, and others, each and all of whom reside more than one hundred miles from the place of trial herein, and more than one hundred miles from any place at which a Circuit Court of the United States for the District of Idaho is appointed to be held by law, at the final hearing for use on behalf of the complainant, before Omri F. Hibbard, a notary public, in and for the city of New York, State of New York, who is not of counsel nor interested in this cause, at the office of Maas and Waldstein, No. 107 Murray street, in the said city of New York, and State of New York, on the 5th day of March, 1900, at 10 o'clock A. M., and thereafter from day to day as the taking of the depositions may be adjourned; and such testimony will be so taken in accordance with the provisions of sections 863,

(Deposition of Martin E. Waldstein.)

864 and 865 of the Revised Statutes of the United States and the Equity Rules.

Dated February 3, 1900, at Salt Lake City, Utah.

DICKSON, ELLIS & ELLIS,
Solicitors for Complainant.

To Messrs. Johnson & Johnson and John H. Miller, Solicitors for Defendant.

Service of the within notice admitted this fifth day of February, A. D. 1900.

Boise, Idaho, February 5th, 1900.

JOHNSON & JOHNSON,
Solicitors for the Defendant.

In the Circuit Court of the United States, for the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.

Deposition of Martin E. Waldstein.

(Before Omri F. Hibbard, Notary Public, at New York City, Borough of Manhattan, March 5, 1900.)

(Deposition of Martin E. Waldstein.)

Appearances:

For the Complainant, A. G. SAFFORD.

For the Defendant, EDWIN H. BROWN.

Martin E. Waldstein, a witness produced, sworn and examined on behalf of the complainant, testified as follows:

(It was orally stipulated in open court by counsel for both parties that the testimony might be taken down stenographically and after being reduced to typewriting, to be submitted to the several witnesses who might be hereafter examined in the cause and then subscribed and sworn to, and to be of the same effect as if reduced to writing by the magistrate, in the presence of the several witnesses; all objections to this form of recording the testimony being expressly waived by both parties.)

Prior to the commencement of the examination of the witness, Mr. Edwin H. Brown, counsel on behalf of the defendant, seasonably objects to the taking of the deposition of this witness or of any other witness under the notice served, on the ground that this is not a proper case for the taking of depositions de bene esse, and not within the provisions of the de bene esse statute, as provided by Congress for the taking of depositions de bene esse.

Direct Examination.

Interrogatory 1. (By Mr. SAFFORD.) What is your name, age, residence and occupation?

(Deposition of Martin E. Waldstein.)

A. Martin E. Waldstein; age, 45; residence, South Orange, N. J.; by profession a chemist and also manufacturer of and dealer in chemicals at No. 107 Murray street, New York City.

Interrogatory 2. Are you the patentee in the United States patent No. 607,719, dated July 19th, 1896?

A. I am.

Interrogatory 3. Are you somewhat familiar with the extraction of the precious metals from their ores and the recovery of values therefrom by chemical process?

A. I am.

Interrogatory 4. When, if ever, was your attention first called to the subject of using zinc in a state of fine subdivision as a precipitating reagent for cyanide solutions charged with the precious metals?

A. If you mean by zinc in fine subdivision, zinc dust, my first connection with this article for the stated purpose was about in March, 1894.

Interrogatory 5. Whether or not at that time you completed your experiments so as to arrive at a definite plan for using that material?

(Objected to as calling for a conclusion and leading; the witness may state what he actually did. Question waived.)

Interrogatory 6. Did you complete your experiments at that time?

(Same objection as to preceding question.)

A. My experiments at that time were sufficiently conclusive to show me that a virtually complete recovery could be had by means of zinc dust. I, however, realized that there were some mechanical difficulties still to be overcome and I was glad to be able to avail myself of the opportunity afforded me by Captain De Lamar to have this method tried on a commercial scale at his works in the west. These experiments made under the supervision of Mr. Cohen were carried on for several months, and when the difficulties had been thoroughly overcome I applied for letters patent.

Interrogatory 7. When was this conversation with Captain De Lamar?

A. In the summer of 1894. I cannot specify the exact time closer than that it must have been prior to the 17th of August of that year, but I know that it must have been several weeks prior to that date.

Interrogatory 8. After the conversation with De Lamar did you meet Mr. Cohen in New York?

A. Mr. Cohen was ordered to come east by Mr. Captain De Lamar for the purpose of speaking to me about this method, and I met him some time prior to August 17th, 1894.

(Answer objected to in so far as it relates to any orders by Captain De Lamar to Mr. Cohen as clearly hearsay and not the best evidence.)

Interrogatory 9. From whom and when did you learn, if ever, that Cohen had been order to consult with you?

A. At the instance of Captain De Lamar I corresponded myself with Mr. Cohen, and was present in Captain De Lamar's office, and heard him dictate a letter

(Deposition of Martin E. Waldstein.)

to his typewriter ordering Mr. Cohen to come to New York for the purpose of consulting me in this matter.

(So far as the answer relates to the contents of any letter of Captain De Lamar it is objected to as not the best evidence; the letter itself should be produced or its absence accounted for.)

Interrogatory 10. Upon the occasion of Mr. Cohen's visit to New York in the summer of 1894, and prior to August 17th of that year, what took place between yourself and Mr. Cohen?

A. I told Mr. Cohen of my invention of recovering the precious metals from a solution made with cyanide by the use of zinc dust, and I furthermore told him that the difficulties that would have to be overcome on a large scale would be to keep the solution in such agitation that the zinc dust would not rapidly sink to the bottom and become so tightly packed that a solution would not readily percolate through it. He promised me to carry on any tests that I might suggest and which he would make, and thereupon I gave him a quantity of zinc dust to try.

Interrogatory 11. Who is Mr. Cohen, and what was his relation to Captain De Lamar at that time?

A. Mr. Cohen was the superintendent of Mr. De Lamar's property in the west, in the State of Nevada.

Interrogatory 12. Did you afterwards receive a letter from Mr. Cohen soon after he returned from the mine in Nevada?

(Deposition of Martin E. Waldstein.)

A. I had quite a lengthy correspondence with Mr. Cohen; all those letters, however, written by him were parts of reports of his work and addressed to Captain De Lamar, and it was my practice to call at the office of Captain De Lamar when such letters had arrived and answer any queries contained therein at Captain De Lamar's office. I therefore have not in my possession any letters directed to me or copies of any answers written to him.

Interrogatory 13. My question relates simply to the fact of whether you received any letter from Mr. Cohen soon after his return to the Nevada Mine and soon after your interview in New York with him. A. I did.

Interrogatory 14. And was that letter received prior to the date you have mentioned?

A. The only date that I recall having mentioned was August 17th, 1894, and I do not recall that I have received a letter from Mr. Cohen prior to that date.

Interrogatory 15. Did you supply the Nevada mines with any other quantity of zinc dust during the autumn of 1894?

A. My firm supplied the Nevada mine with several lots of zinc dust, which zinc dust was billed to them as boxide, which name was an arbitrary one applied to this article by my firm, and which name was used in connection with zinc dust used in other manufactories.

Interrogatory 16. Do you remember of a shipment of zinc dust occurring some time in November, 1894?

(Deposition of Martin E. Waldstein.)

A. In a previous deposition made by me I had the books of my firm at my disposal and I gave the exact quantities and the exact time of date of each shipment made; I believe that there was a shipment made in November.

Interrogatory 17. Did you afterwards make application for letters patent of the United States to protect your discovery? A. I did.

Interrogatory 18. About what time?

A. In the early part of 1895.

Interrogatory 19. And who were your solicitors in that application?

A. Cowen, Dickerson & Brown, of which Mr. Edwin H. Brown was a member.

Interrogatory 20. Did you have consultations with that firm or their employees with reference to your proposed application?

A. I naturally had a number of consultations with Mr. Gref who was at that time a member or an employee.

Interrogatory 21. Did you then explain as client of that firm your various experiments and experiences in your endeavor to practically use this material as a precipitating reagent?

A. I cannot say if I explained all my experiments, but I naturally explained the nature of my discovery with scope and all other particulars necessary to enable my attorneys to draw proper papers.

Q. Have you ever consented to the employment of

(Deposition of Martin E. Waldstein.)

that firm or any member of it to antagonize the patent which was issued to you? A. I did not.

Q. When did you first hear that an Englishman by the name of Sulman was attempting to secure or had secured a patent for the use of zinc dust in this art?

A. At the request of Captain De Lamar Mr. Safford was substituted as attorney in the prosecution for the obtaining of letters patent for my inventions, and Mr. Safford notified me that a Mr. Sulman claimed priority of invention. To the best of my recollection, this was in the year 1896, and this was the first time I ever heard of the name of Sulman in connection with zinc dust as used for the recovery of precious metals from their solution in cyanide of potassium.

Q. When did you first hear, if ever, and prior to March, 1896, that this material had been successfully used or claimed to have been successfully used by others than Sulman?

A. I had never heard that it had been successfully used prior to 1896 by anyone.

Q. If you know of any matter or thing pertinent to the issue in this case please state it. A. I do not.

Q. Are you in any way interested in the event of this suit? A. I am not.

Cross-Examination.

(By EDWIN H. BROWN.)

XQ. In answer to interrogatory six, you speak of experiments of your own and mechanical difficulties met

(Deposition of Martin E. Waldstein.)

with in these experiments. Please state what these experiments were and what were the difficulties you met with.

(Objected to and to all other questions in this cross-examination, propounded by Mr. Brown, or anyone on behalf of the law firm with which he is connected, for the reasons disclosed in questions and answers to interrogatories numbered nineteen et sequitur.)

A. When I conceived the invention of utilizing zinc dust for the recovery of precious metals from their solution of cyanide of potassium, I made solution of gold in various strengths of solutions of cyanide of potassium, and took the necessary quantity of zinc dust to precipitate the gold from the solution, always utilizing, however, a slight excess of zinc dust, primarily on account of its varying strength, and secondly for the reason that it requires a certain surplus of zinc dust to prevent a re-absorbing of the precious metals. I dropped this zinc dust into the flask containing the solution, and thereby was enabled to extract practically all the precious metal or gold that was in the solution. In carrying out these tests I discovered that unless the agitation was very thorough, that the zinc dust, on account of its heavy weight, would sink very rapidly to the bottom and form a layer on the bottom and thereby prevent its action on the solution. This was one of the mechanical difficulties that I had spoken of which had to be overcome. I subsequently tried to arrange, by means of various filters, thin

(Deposition of Martin E. Waldstein.)

layers of zinc dust, through which I attempted to filter the cyanide solution of gold, and found that if a layer of zinc dust was very thick it was almost impossible to filter it downward through this mass. These difficulties I explained to Captain De Lamar and subsequently to Mr. Cohen, and one of my suggestions for a test to be made by Mr. Cohen was to endeavor to filter the cyanide solution of the precious metals upward through a layer of zinc dust, believing that the pressure of the upward flow would create a sufficient mechanical motion to allow the finely divided particles of zinc dust to act with their full surface upon the solution and thereby precipitate all the gold from the solution. The fact that I was enabled to precipitate or recover from a solution of gold in a cyanide of potassium solution practically all the gold contained therein—in fact, to such a degree that by the very difficult mechanical tets applied, no trace of gold was shown in the solution, convinced me as also Captain De Lamar and Mr. Cohen, of the efficacy of zinc dust for this purpose, and naturally made them very desirous to have these tests made on a larger scale.

XQ. Had you at that time any knowledge of the use of zinc dust as a precipitant?

A. I have already answered this question in the negative, and I repeat that I had no knowledge of zinc dust ever having been used prior to my filing the application for the purpose of recovering precious metals from their solution in cyanide of potassium.

(Deposition of Martin E. Waldstein.)

XQ. I inquired whether or not you had knowledge of the use of zinc dust as a precipitant?

A. To my knowledge, it has never been used as a precipitant heretofore for anything.

XQ. Had you at that time any knowledge of zinc dust being used as a precipitant for precious metals?

A. I was quite familiar with the various so-called cyanide processes which all depended upon the use of zinc in various forms for the recovery from the cyanide solution of the precious metals by precipitation of the gold contained therein.

XQ. In answer to interrogatory fifteen, you speak of your firm. Will you please give the firm name?

A. The firm name is Maas & Waldstein, and the address of the firm, at that time, was 44 Trinity Place, but at present it is 107 Murray street, New York city.

XQ. And you are the Waldstein of that firm?

A. I am the Waldstein of that firm.

XQ. This firm, in 1894, dealt in zinc dust, did it not?

A. Yes, sir.

XQ. For what purposes was it used?

A. Zinc dust had been used prior to my invention only for the purposes of reduction, principally in the dyeing industry, in the so-called indigo vat, in which instance it was used for the purpose of reducing indigo blue from its insoluble state to indigo white or indican; also a reducing of acid for the bleaching of various substances, principally by my firm in the use of redurcing the color or bleaching the color of sugars and molasses. Not de-

(Deposition of Martin E. Waldstein.)

siring to have the trade at large conversant with this use, as applied by my firm, we gave to zinc dust the arbitrary name of "boxide" as heretofore testified to by myself. These are the only uses that zinc dust has ever, to my knowledge (and I speak with quite an authority on that subject), been used, and my invention, which gave to it a further use, namely, in the recovering of precious metals from their solution.

XQ. Will you briefly describe how zinc dust was used for these various purposes?

A. In the indigo dyeing bi-sulphite of soda solution is mixed with zinc dust, which reduces the sulphurous acid contained therein into hydro-sulpurous acid, which has a very strong reducing action, and which reduces the indigo from its blue insoluble state into its white soluble form. For the bleaching of other commodities, hydro-sulphurous acid, or its salts, are first produced by the action of zinc on bi-sulphate of soda, and then this acid so produced is mixed with the substance desired to be bleached or reduced. Those are the only two uses that zinc dust was applied to or is applied to at present, with the exception of for the recovery of precious metals now, to my knowledge.

XQ. What is zinc dust?

A. Zinc dust is a product produced in the original production of zinc or spelter from its ores by the ordinary furnace processes and it is very finely divided zinc drawn or carried over by the draught from the flues and

(Deposition of Martin E. Waldstein.)

contaminated with varying quantities of oxide of zinc and other impurities.

XQ. What other impurities?

A. Flue dust or dust from chambers or impurities contained and volatilized in the ore.

XQ. Will you describe briefly the process by which this zinc dust is formed, if you know?

A. As I have before stated, the ordinary process of manufacturing of zinc in furnaces is by using any reducing agent or in case of a sulphide of zinc being used as a raw material, iron to reduce the zinc from the raw into its metallic state. This requires high heats and naturally in these high heats a certain quantity of zinc dust becomes volatilized which is carried over by the draught into the flues of these furnaces.

XQ. Did you ever see the operation by which this zinc dust is formed? A. No, never.

XQ. Do you know the character of the furnaces used?

A. Only from general chemical knowledge.

XQ. You speak of varying quantities of oxide and other impurities. What occasions the variations?

A. That is very hard for me to state, but I should judge just the various amount of oxygen admitted into the furnaces.

XQ. How do you mean admitted?

A. If air would be admitted freely, no zinc dust could be formed at all, because at that temperature or the temperature of the furnaces, all the zinc in such fine di-

(Deposition of Martin E. Waldstein.)

vision would immediately burn up and no metallic zinc would go over in its fine form at all. I might add here that it is barely possible that some of the oxide contaminating zinc dust might be carried over from the oxide contained in the natural state in the ore. As I said, I did not see these furnaces in operation and I only know this of my general knowledge and not from any specific knowledge that I could testify to.

XQ. In these furnaces air is kept out as much as possible? A. As much as possible.

XQ. Can you say to what extent oxides vary?

A. Well, I have made frequent analysis of zinc dust that I handled myself and I have found some to contain as high as eighteen per cent of oxide; the average run, however, to the best of my knowledge, generally speaking, is about ten per cent.

XQ. Can you state the different impurities you found in these tests?

A. No, I cannot. I have never kept a record of them, as they were unimportant.

XQ. You have stated that prior to 1894 you had knowledge of the use of zinc as a precipitant for precious metals in cyanide solutions? A. I did.

XQ. To your knowledge, in what form is this zinc used? A. Plates, shreds and filings.

XQ. Do you mean to be understood that it was used in this form indiscriminately or sometimes in one form and sometimes in the other?

A. Sometimes in one and sometimes in the other.

(Deposition of Martin E. Waldstein.)

XQ. Do you know why it was used in these different forms? A. I do.

XQ. Please state.

A. The object of the zinc being to reduce the gold from its solution to its metallic state by the action of zinc on the double salt of cyanide of potassium and cyanide of gold, it is very natural that the larger surface of zinc that would come in contact with the solution containing the gold, would be, the quicker action. Therefore, the first use of zinc in plates was changed into the use of shreds or small particles of zinc. This very fact that this was done led me to my discovery that if I could put the full surface of zinc contained in zinc dust in the finest possible division, I would achieve the desired result more fully.

XQ. You were put into interference, were you not, on the application resulting with the grant of the patent in suit, with Sulman & Teed?

(Objected to as not growing out of cross-examination.)

A. I believe so.

XQ. Do you recollect giving any deposition in that interference? A. I do.

XQ. Do you recollect, in answer to the following question, making the following reply?

"Q. 3. When was your attention called to the subject of using zinc in a state of fine subdivision as a precipitating reagent for cyanide solutions charged with the precious metals?

(Deposition of Martin E. Waldstein.)

"A. In the early part of 1894, about the month of February or March, I was at work to overcome the fouling of cyanide solutions for the precipitation of the precious metals. I then attempted to precipitate the zinc from the cyanide solution by other methods. In speaking about it to Captain De Lamar, he suggested if there could be used a form of zinc other than the zinc that we were universally using theretofore, and I at once said that zinc dust was a form of zinc in the finest possible division and told him that I would immediately proceed to make tests in that direction with zinc dust."

A. I do.

XQ. The patent was afterwards granted to you?

A. It was.

XQ. Who made this application for the patent as your attorney? A. Well, it was made by Mr. Safford.

XQ. Were you sole owner of your invention at that time? A. I was not, never was.

XQ. Who was interested with you?

A. Captain De Lamar and Mr. Cohen, his superintendent.

By Mr. SAFFORD.—I advise the witness to decline to answer any questions in regard to the ownership of the patents.

XQ. Did Sulman & Teed file this interference?

A. I do not know.

XQ. Do you know whether or not there was a settlement made with them? A. I do not know.

(Deposition of Martin E. Waldstein.)

XQ. From your testimony it appears that Mr. Safford was substituted for Cowen, Dickerson & Brown in the prosecution of your application before the Patent Office. Is this how you meant to be understood? A. It is.

XQ. Do you know anything about it? A. I do not.

XQ. So far as you know no one connected with the firm of Cowen, Dickerson & Brown had anything to do with the application, upon which the patent in suit was granted?

A. I know of my own knowledge that no member of the firm of Cowen, Dickerson & Brown, of which Mr. Edwin H. Brown is a member, had anything to do whatsoever with the second application, made for the same purpose as this patent.

XQ. I suppose you meant to be understood that Cowen, Dickerson & Brown acted in prosecuting the first application? A. I do.

XQ. Who did you see that was connected with this concern? A. Mr. Anthony Gref.

XQ. Did you see Mr. Edwin H. Brown at all in that connection, or did he have anything to do with it so far as you know? A. He did not.

XQ. What connection had Mr. Gref, to your knowledge, with the concern of Cowen, Dickerson & Brown?

A. I was under the impression that he was a member of the firm.

XQ. To whom did you pay for this application?

A. Cowen, Dickerson & Brown.

(Deposition of Martin E. Waldstein.)

XQ. What experiments have you further made, if any, with the use of finely divided zinc as a precipitant for precious metals in cyanide solutions?

A. I have made a number of experiments with the use of zinc dust, if that is what you mean by a finely divided zinc, for the precipitation of precious metals from their cyanide solution, but have made no other tests with any other form of zinc, and relied purely upon the reports and the works of others for the knowledge and information I have on this subject.

XQ. Don't you know it to be a fact that in 1894 it was old in the art to use zinc dust as a precipitation for copper from copper solution?

A. It was not, so far as I know.

MARTIN E. WALDSTEIN.

United States of America,
State of New York, } ss.
County of New York.

I, Omri F. Hibbard, a notary public within and for the county of Kings, and having a certificate filed in New York County, hereby certify that on the 5th day of March, 1900, at room No. 1016, 149 Broadway, in the city of New York, Borough of Manhattan, at 10 o'clock A. M., was produced and personally came before me as such notary public, Martin E. Waldstein, a witness on behalf of the complainant, to depose in a certain civil cause depending in the Circuit Court of the United States (Ninth Circuit), sitting in equity for the District of Idaho, wherein Joseph

(Deposition of Martin E. Waldstein.)

R. De Lamar is the complainant and the De Lamar Mining Company, Limited, is the defendant, and whose testimony is alleged to be competent and material in said civil cause on behalf of the complainant.

The cause for taking said deposition is the fact that the said witness resides more than one hundred miles from the place of trial of said cause, and more than one hundred miles from any place at which a Circuit Court of the United States for the District of Idaho, is appointed to be held by law.

This deposition being taken in accordance with the annexed citation; the adverse party was duly notified and attended the taking of said deposition, by counsel. The complainant was represented by A. G. Safford, and the defendant by Edwin H. Brown.

The said Martin E. Waldstein was by me carefully examined, cautioned and duly sworn, according to law, to testify the whole truth touching the matter in controversy, and did depose and say as hereinabove written down. I am not interested in or counsel for either party in the above entitled action.

Before taking the testimony, it was expressly arranged by agreement of counsel that the place for the taking of said depositions should be changed from No. 107 Murray street, the place indicated in the notice, to my office, No. 149 Broadway, New York City.

Dated, March 5th, 1900.

[Seal] O. F. HIBBARD,

Notary Public, Kings County. Certificate filed in New York County.

(Deposition of Martin E. Waldstein.)

My commission as notary public will expire on the 30th day of March, 1901.

[10c. R. S.]

Fees as notary public....	$10.00
Stenography and typewriting....	7.50
	$17.50

Paid.

[Endorsed]: In Equity. In the Circuit Court of the United States, for the District of Idaho. Joseph R. De Lamar vs. The De Lamar Mining Company, Limited. Deposition. Filed March 16th, 1900. A. L. Richardson, Clerk.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.

Notice as to Taking Deposition of Arthur W. Hendricks.

Please take notice that the complainant herein will take the testimony of Cabell Whitehead, Professor Munroe, of Columbian University, Washington, D. C., and Arthur W. Hendricks, all of whom reside in the city of Washington, D. C., and others, each and all of whom reside more than one hundred miles from the place of trial herein, and more than one hundred miles from any place

(Deposition of Arthur W. Hendricks.)

at which a Circuit Court of the United States for the District of Idaho is appointed to be held by law, at the final hearing for use on behalf of the complainant, before Henry W. Reed, Esq., a notary public in and for the city of Washington, D. C., who is not of counsel nor interested in this cause, at his office room 3 (Three), 1416 "F" street, N. W. Washington, D. C., on the 27th day of February, 1900, at ten (10) o'clock A. M., and thereafter from day to day as the taking of the depositions may be adjourned; and such testimony will be taken in accordance with the provisions of sections 863, 864 and 865 of the Revised Statutes of the United States and the Equity Rules.

Dated Salt Lake City, Utah, February 3d, 1900.

DICKSON, ELLIS & ELLIS,
Solicitors for Complainant.

To Messrs. Johnson & Johnson and John H. Miller, Solicitors for Defendant.

Serving of the within notice admitted this fifth day of February, 1900.

Boise, Idaho, February 5, 1900.

JOHNSON & JOHNSON,
Solicitors for Respondent.

The taking of testimony of the witness, Cabell Whitehead, is hereby continued to the 8th day of March, 1900, same hour and place.

A. G. SAFFORD,
Solicitor for Complainant.
EDWIN H. BROWN,
Solicitor for Defendant.

(Deposition of Arthur W. Hendricks.)

In the Circuit Court of the United States, Ninth Circuit, for the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR,
vs.
THE DE LAMAR MINING COMPANY, LIMITED.

Deposition of Arthur W. Hendricks.

(Before Henry W. Reed, a Notary Public, at Washington, D. C., on the 27th day of February, and the 9th day of March, 1900.)

Appearances:

For the Complainant, A. G. SAFFORD.

For the Defendant, EDWIN H. BROWN.

Arthur W. Hendricks, a witness produced, sworn, and examined on behalf of the complainant, testified as follows:

(It was orally stipulated in open court by counsel for both parties that the testimony might be taken down stenographically, and after being reduced to typewriting, to be submitted to the several witnesses who might be hereafter examined in the cause, and then subscribed and sworn to, and to be of the same effect as if reduced to writing by the magistrate in the presence of the several witnesses; all objections to this form of recording the testimony being expressly waived by both parties.)

Prior to the commencement of the examination of the witness, Mr. Edwin H. Brown, counsel on behalf of the

(Deposition of Arthur W. Hendricks.)

defendant, seasonably objects to the taking of the deposition of this witness or of any other witness, under the notice served, on the ground that this is not a proper case for the taking of depositions de bene esse, and not within the provisions of the de bene esse statute, as provided by Congress for the taking of depositions de bene esse.

Direct Examination.

Interrogatory 1. (By Mr. SAFFORD.) What is your name, age, residence, and occupation?

A. Arthur W. Hendricks; age, 29; residence, Washington, D. C.; superintendent of a mine at Gibsonville, N. C.

2. How long have you been engaged in the business of mining? A. About thirteen years.

3. And where?

A. In New Mexico, North Carolina, and for a time in Maryland.

4. Have you ever experimented in the use of cyanide for the recovery of gold and silver from their solutions?

A. Yes; I practiced it at the Sawyer Mine, near this city, for the purpose of testing the efficacy of a leaching trough in the treatment of ores by the cyanide process.

5. Was your attention ever called to a pamphlet by Professor S. E. Christie, with reference to the use of cuprous chloride in the recovery of precious metals from their solutions? A. It was.

6. Does that process thoroughly recover these metals?

A. In a laboratory test, it has been practically demon-

(Deposition of Arthur W. Hendricks.)

strated, but I know of no place in which it has been operated on a large scale; it destroys the solution.

7. Did you make experiments with the use of zinc dust about the first of February, 1897?

A. At the request of Mr. Safford, I made experiments in the use of zinc dust as compared with the mechanically divided zinc.

8. And did you, at that time, make your affidavit, which was filed, as you understand, in the case of Waldstein's application for a patent for the use of zinc dust?

A. I did.

9. When was that affidavit made with reference to the time of making the experiments of which you have spoken?

A. The day following the experiments.

10. Will you incorporate into your testimony the statement you made in that affidavit in regard to the experiments which you made at my request, and are those experiments there made exactly correct?

A. Yes, and that statement is as follows: "A quantity of cyanide solution was prepared containing one per cent of the cyanide of potassium and ninety-nine per cent of water; to this solution was added 5-10 of a gramme of the di-oxide of sodium; in this solution I dissolved 18 leaves of gold leaf, weighing 300 milligrammes, such gold leaf as is commonly used by painters, the charged solution was then divded into three equal portions; into one of the three was put 2 grains of finely divided, pulverized zinc, and into another third was put 2 grains of

(Deposition of Arthur W. Hendricks.)

zinc dust, and into the other third was put 5 grains of zinc dust; the two portions containing the same quantity of pulverized zinc and zinc dust were then agitated in a closed flask separately, each for ten minutes, the other portion containing the greater quantity of zinc dust was agitated for twenty minutes; after agitation the several solutions were filtered and the residuum of the first two were submitted to scorification and cupellation; there was a considerable quantity of zinc sediment in the solution treated with pulverized zinc, there was very little of that sediment in the solution containing the zinc dust; the result of the recovery by cupellation was from the pulverized zinc precipitation 5-10 of a milligramme, from zinc dust, where the two grains were used, 32 and 75-100 milligrammes; the remaining solutions were then treated separately with cuprous chloride, filtered, scorified and cupelled, separate buttons were obtained from this latter continuation of the process, and they are marked, '1,' '2,' and '3,' respectively, and attached to this deposition, and they respectively weigh as follows:

"No. 1, the button obtained by cuprous chloride recovery from the solution containing 100 milligrammes of gold dissolved by cyanide and di-oxide of sodium after being treated with 2 grains of mechanically divided, pulverized zinc, and agitated for 10 minutes, weighs 99.5 milligrammes.

"No. 2, the button obtained by cuprous chloride recovery from the solution containing 100 milligrammes of gold dissolved by cyanide of di-oxide of sodium after be-

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ing treated with 2 grains of zinc dust and 10 minutes' agitation, weighs 67.25 milligrammes.

"No. 3, the button obtained by cuprous chloride recovery from the solution containing 100 milligrammes of gold dissolved by cyanide and di-oxide of sodium, after being treated with 5 grains of zinc dust and 20 minutes' agitation, weighs 65.5 milligrammes."

(The foregoing question and answer were seasonably objected to by counsel for the defendant for the following reasons: I object to incorporating this statement in the answer of the witness, because it is in the nature of a declaration in interest, and therefore, inadmissible. The witness is present and may be questioned as to the alleged facts in his affidavit, and I know of no practice which allows an affidavit to be copied or incorporated as the answer of the witness.)

11. Will you detail the comparative experiments which you made with cyanide solution charged with the precious metals at that time, when you used zinc dust and mechanically divided zinc, refreshing your recollection, if you desire to do so, by an examination of your affidavit?

(I object to the witness referring to his affidavit for the purpose of refreshing his memory, because it has not been shown that the witness cannot testify without referring to this affidavit, nor has it been shown that this affidavit is a memorandum made by the witness at the time of making these experiments.)

(Question waived for the present.)

(Deposition of Arthur W. Hendricks.)

12. Did you make experiments in February, 1897, at my request, with cyanide solutions, precipitating by zinc dust, and also by mechanically divided zinc?

A. I did.

13. Did you at that time make written memoranda of the result of those experiments? A. I did.

14. When were the detail of those experiments reduced to the form of an affidavit, if ever?

A. On the following day.

15. Where are those original memoranda—I mean the memoranda made in the laboratory at the time of the experiment?

A. They were destroyed, as I had no further use for them.

16. Do you remember, so that you can now testify without refreshing your memory, as to the exact result in grains and tenths of grains of these experiments?

A. I cannot.

17. Please answer the question, No. 11.

(Objection renewed. It appears that the memoranda has been destroyed and the witness may not refer to an affidavit which is not connected in any way with this memoranda.)

A. As I remember, I took a certain amount of gold leaf, dissolved that in a cyanide solution. I then added a certain amount of zinc dust to a portion of this solution and agitated same for, as I remember, about ten minutes. I also added the same amount of mechanically divided zinc to another portion of this solution and

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agitated it for the same period of time. To a third portion of this solution I added a larger amount of zinc dust and agitated same for a few minutes longer. The result demonstrated that a considerable amount of mechanically divided zinc still remained in the solution, with a very low percentage of precipitation and that the zinc dust was entirely consumed, giving a much larger precipitation.

18. Will you look at your affidavit, if necessary to refresh your recollection, and state what the percentage of precipitation was where mechanically divided zinc was used?

(I object to the witness looking at his affidavit, as it is not memoranda made at the time of the experiments.)

A. It was about 5-10 of one per cent.

19. Where zinc dust was used in the comparative experiments as to time and quantity, how much was recovered?

(Same objection.)

A. 33.25 per cent.

Cross-Examination.

(By EDWIN H. BROWN, without waiving any objections.)

XQ. 20. Your experiments, I think, have been mere laboratory experiments?

A. Yes, in this particular instance.

XQ. 21. Have you made any other experiments of this nature?

A. With zinc dust, am I to understand?

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XQ. 22. Yes, with zinc dust.

A. No, I have not.

XQ. 23. Have you made any other experiments with zinc in any form as a precipitant for precious metals in cyanide solutions? A. I have.

XQ 24. When?

A. I began experimenting with zinc to recover gold from cyanide solutions some three years ago.

XQ. 25. Describe these experiments.

A. I first tried what is known as the Kendall zinc amalgum process which is composed of mercury and zinc, and to recover the gold in a number of instances I filtered the solution through the amalgum. I afterwards used filtered zinc in the recovery of gold from cyanide solutions while making experiments at the Sawyer mine in Maryland. I afterwards used the filtered zinc in experiments in Mercur, Utah. These latter experiments were made by passing the solution through a box containing several apartments in which the filiform zinc was used in a mass, somewhat similar to excelsior—that is, fibre.

XQ. 26. You have spoken of experiments in the use of zinc dust as compared with mechanically divided zinc—where were these experiments made?

A. Made in Mount Pleasant, a suburb of Washington.

XQ. 27. When?

A. Somewhere about February, 1897, as I recollect.

XQ. 28. Who was present at the time?

A. Mr. George B. Chittenden.

XQ. 29. Where is Mr. Chittenden now?

(Deposition of Arthur W. Hendricks.)

A. In Arizona.

XQ. 30. Whereabouts in Arizona?

A. Florence, Arizona.

XQ. 31. Anyone else present? A. Mr. Safford.

XQ. 32. What is his full name? A. A. G. Safford.

XQ. 33. Solicitor in this suit? A. Yes.

XQ. 34. Have you any of the zinc or zinc dust used in these experiments? A. I have not.

XQ. 35. I left Washington shortly after these experiments were made, and have not had occasion to look it up since.

XQ. 36. Then you do not know what has become of it?

A. No.

XQ. 37. Can you state how finely divided the zinc was which you used?

A. I should say it would pass through a screen containing 150 meshes to the inch.

XQ. 38. Did you screen it. A. No, I did not.

XQ. 39. Then your answer is a mere guess?

A. It is.

XQ. 40. Have you any idea of the weight of each particle of this zinc?

A. I did not weigh it, but should suppose it would be a very small proportion of a milligramme, probably a thousandth part.

XQ. 41. How finely divided is zinc dust?

A. I should term it an impalpable powder.

XQ. 42. Did you ever screen it? A. I have.

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XQ. 43. Do you know what mesh screen it would sift through, that is, the finest mesh?

A. I have no definite idea as to the finest mesh; have tried it in a screen containing 125 meshes to the square inch, and found that all passed through it.

XQ. 44. Where did you obtain the zinc dust used in these experiments?

A. From a sample given to me by Mr. A. G. Safford.

XQ. 45. Where did you obtain the finely divided zinc?

A. I filed it with a very fine file, I should say, from a portion of metallic zinc.

XQ. 46. How long after it was made, was it used in your experiments? A. Immediately.

XQ. 47. Can you state whether or not zinc or zinc dust will dissolve to any extent, in a cyanide solution, if there is no gold or silver in the solution to precipitate?

A. I think it will.

XQ. 48. What makes you think so?

A. In order to get any precipitation at all, the zinc must be acted upon by a cyanide solution, which is usual in all cases of meallic precipitation, and we know that the zinc is acted upon by the cyanide by reason of its different solutions showing zinc as in a soluble state.

XQ. 49. Do you speak now from personal experiments or only from what you have gathered from text-books and writings upon the subject?

A. Principally from text-books and also from experiments.

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XQ. 50. State fully what your experiments have been in this line.

A. I have taken a certain amount of filiform zinc and added to that a cyanide solution, allowing the same to remain in the cyanide solution until it had disappeared. I have also tested by evaporating a cyanide solution containing zinc and assayed the residuum.

XQ. 51. Of what strength was the cyanide solution in which you made these experiments?

A. They had no definite standardized solution.

XQ. 52. Then you do not know?

A. And I should say they contained probably from 5-10 to 1 per cent.

XQ. 53. Have you any knowledge of the strength of the cyanide solution used in actual practice in dissolving the precious metals from ores?

(Objected to because it does not appear and is not a fact that cyanide solutions of the same strength are used in the same ore.)

A. I have.

XQ. 54. According to your knowledge, what is the strength of such solutions?

(Objected to for the same reason as before.)

A. I cannot state definitely as to the amount used, as the different ores which are treated for their precious metals require different strengths and different amounts of time in which to extract the precious metals.

XQ. 55. Answer to the best of your knowledge as to

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the weakest and strongest solutions which are used for this purpose.

A. I know of instances where as low as one-half a pound to the ton of solution is used, and as high as ten pounds to the ton.

XQ. 56. In these experiments which you made, where you found that the zinc was dissolved, for how long a period was the zinc submitted to the action of the solutions? A. I cannot state the time.

XQ. 57. To the best of your recollection, give it to me.

A. I probably left it in solution a day.

XQ. 58. Is it your understanding that in actual practice the zinc precipitant is subjected to the action of the solution for a day each time the zinc is used for precipitating precious metals?

(Objected to because it is not true in practice that zinc is used, except in the case of cyanide solutions charged which the precious metals, and the experiment concerning which the witness has been examined relates to solutions not charged with the precious metals, and the question is therefore misleading.)

A. As I have seen the zinc used in the filiform condition, the solution is passed through it, and the filiform zinc is not agitated, as I tried in my experiments.

XQ. 59. Will you answer my question, please?

(Objected to because the original question is unintelligible, untrue and misleading. I do not see how the witness can answer it and I advise him to say that he de-

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clines to answer the question because he cannot do it.)

A. I decline to answer the question.

XQ. 60. Why do you decline to answer the question?

A. Because I cannot see where it can be answered with any degree of intelligence on my part.

XQ. 61. Do you mean that you have no knowledge at all concerning it?

(I advise him to decline to answer the question. No one can give an opinion as to the effect of putting a precipitant into an uncharged solution and recovering contained metals. The hypothesis on which the question seems to be answered is a contradictory one, and I advise the witness to decline to answer the last question.)

A. I decline.

XQ. 62. Why do you decline to answer the question?

(The witness may refer to his last answer as a reason for his declination.)

XQ. 63. Is it your understanding that zinc will dissolve more quickly in a cyanide solution in which no precious metals are contained than in such solutions where there are precious metals?

(I object to that as not growing out of the direct examination.)

A. I decline to answer that on the grounds that I know of no instance where it has tried.

XQ. 64. Where what has been tried?

A. Where the zinc is dissolved more quickly by the presence of gold in the solution, or where the solution is free from gold.

(Deposition of Arthur W. Hendricks.)

XQ. 65. Have you ever in your experiments found zinc to dissolve in cyanide solutions containing precious metals? A. I have.

XQ. 66. Have you experimented with zinc in cyanide solutions not containing precious metals?

A. I have, for my own amusement.

XQ. 67. I gather from your testimony, you are not able to state from these experiments whether zinc will dissolve more quickly in the one than in the other?

A. I am not.

XQ. 68. You have already testified to experiments showing that zinc will dissolve in cyanide solutions of a certain strength, after being exposed to such solutions for one day; in these solutions precious metals were present, were they not?

A. Not in that particular instance.

XQ. 69. Then you are not able to state from experiments whether or not zinc will dissolve in cyanide solutions containing precious metals?

(I object to the question because the witness has already said that it would dissolve. I object to the form of the question also as not asked as an interrogatory.)

A. I decline to answer on the grounds that I have already answered that question.

(I advise the witness that if the question is put in the form: Are you able to state from experiments whether or not zinc will dissolve in cyanide solutions containing precious metals—to answer the question. Do you consent to that modification of your question?)

(Deposition of Arthur W. Hendricks.)

XQ. 70. I will consent to anything to get a direct answer.

A. I am willing to state, having tried it, both experimentally and practically.

XQ. 71. Now, suppose you answer my question?

A. It does dissolve.

XQ. 72. You know this from experiments of your own? A. I do.

XQ. 73. That is to say, you have tried it and found that it does dissolve? A. Yes.

XQ. 74. How strong was the solution of cyanide?

A. As I made a great number of experiments, I am unable to state the exact amount used in any one case, but will say that it ranged from 5-100 of one per cent to two per cent.

XQ. 75. How long was the zinc submitted to the action of the solution in its weakest form?

(I object to the question, because he does not state whether he refers to a charged solution or an uncharged solution, and his inquiries have been directed to both forms of solutions.)

A. As I said before, I have made so many that I cannot give any definite time.

XQ. 76. That is to say, you do not know?

A. But will say that it would range from one hour to probably three or four.

XQ. 77. In your experiments, have you submitted the zinc to the action of the solution for a longer period where a stronger solution has been used?

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(I object to the question because he does not say whether he refers to a charged or uncharged solution.)

A. To that I can give no positive answer.

XQ. 78. You have before testified that you have submitted the zinc to the action of the solution for one day —was this a strong or a weak solution?

A. I do not remember as to making a statement of that kind.

XQ. 79. Well, is it a fact that you have submitted the zinc to such a solution for one day?

(Objected to because the question does not specify a charged or an uncharged solution.)

A. I did make an experiment with zinc and think that it took about a day.

XQ. 80. Was this experiment with a weak or a strong solution?

A. I cannot answer that question definitely.

XQ. 81. Why?

A. Because such a time has elapsed, and not having any notes, I have forgotten, but think it might have been within one per cent, as I generally used solutions ranging from 1-10 to 1 and 2 per cent.

XQ. 82. From your experiments, are you able to state how long it takes zinc to precipitate the precious metals from cyanide solutions?

(Objected to because the kind of solution is not stated, because the amount of contained precious metals is not stated, because the form in which it is proposed to pre-

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sent the zinc to the solution, whether in massive form or sheets, ingots, strips, shavings, or the more minute form of zinc dust is proposed, and because it is indefinite, uncertain, obscure and misleading.)

A. To that I can give no definite answer, as I have found that solutions carrying precious metals take different amounts of time.

XQ. 83. Can you not state the longest time necessary for such precipitation and the amount of metal precipitated in that time by the use of zinc in any form?

(Question objected to because kind of solution is not specified and the quantity of the contained minerals, precious and base, is not stated, nor the character of the solution.)

A. I cannot answer that question, as you do not give the strength of solution and amount of gold contained therein.

XQ. 84. Inasmuch as I am asking about your personal experiments, I do not see how I can give these proportions, but I ask you to give them. Can you not answer that question?

(Objected to because it does not specify the particular experiment concerning which the witness is interrogated.)

A. I cannot state the longest time, as I do not remember.

XQ. 85. Do you know whether or not the zinc precipitant will dissolve in a cyanide solution after the precious metals have been precipitated?

(Deposition of Arthur W. Hendricks.)

(I object to that as not growing out of the direct examination.)

A. To the best of my knowledge it will.

XQ. 86. *I ask whether you or not.* A. I do.

XQ. 87. How do you know?

A. By having dissolved a certain portion of gold in a cyanide solution, adding to that filiform zinc, after a time tested the solution for gold, the same solution having an excess of zinc in a metallic state which dissolved after remaining in the solution for a further time.

XQ. 88. When was this experiment made?

A. Some two or three years since.

XQ. 89. Give the strength of the solution.

A. I do not remember it.

XQ. 90. How much zinc was used?

A. I cannot state, as I did not weigh it.

XQ. 91. How long was it exposed to the action of the solution? A. I cannot state the length of time.

XQ. 92. What was the amount of gold recovered?

A. It was all recovered.

XQ. 93. That does not answer my question—how much was in solution?

A. The gold was not weighed, but was simply a gold leaf, such as used by painters; nothing was weighed, as it was for my own amusement.

XQ. 94. Do you know of your own knowledge whether or not in actual practice, where zinc is used as a precipitant for precious metals in cyanide solutions, whether

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or not any of the zinc will dissolve after the precious metals have been precipitated?

(Objected to as already asked and answered.)

XQ. 95. When I say actual practice, I mean where the solution is of the strength commonly used for this purpose?

(Objected to because there is no uniform practice in regard to strength of solution.)

A. I do.

XQ. 96. How do you know?

A. By having been informed by millmen.

(The witness' answer is objected to as not of the best evidence.)

(Witness continues:) And having made experiments of my own.

XQ. 97. Do you refer to other experiments than you have already testified to in this relation?

A. When I say experiment, I mean the one which I have already testified to.

Redirect Examination.

(By Mr. SAFFORD.)

RD. 98. You have testified that I gave you what purported to be a certain amount of zinc dust at the time you made the experiments for me some two years ago; have you ever visited the Golden Gate Mill at Mercur, where zinc dust is practically used, and did you see there the zinc dust used by the operators of that mill?

A. No, I was never in the Golden Gate Mill.

(Deposition of Arthur W. Hendricks.)

RD. 99. Have you been in any mill where zinc dust is used? A. No, I have not.

ARTHUR W. HENDRICKS.

United States of America, } ss.
District of Columbia. }

I, Henry W. Reed, a notary public within and for the District of Columbia, hereby certify that on the 27th day of February, A. D. 1900, at room 3, 1416 F street, N. W., in the city of Washington, in said District, at 10 o'clock A. M., was produced and personally came before me as such notary public, Arthur W. Hendricks, a witness on behalf of the complainant, to depose in a certain civil cause depending in the Circuit Court of the United States (Ninth Circuit), sitting in equity for the District of Idaho, wherein Joseph R. De Lamar is the complainant, and the De Lamar Mining Company, Limited, is the defendant, and whose testimony is alleged to be competent and material in said civil cause on behalf of the complainant.

The cause for taking said deposition is the fact that the said witness resides more than one hundred miles from the place of the trial of said cause, and more than one hundred miles from any place at which a Circuit Court of the United States for the District of Idaho is appointed to be held by law.

This deposition being taken in accordance with the annexed citation; the adverse party was duly notified and attended the taking of said deposition by counsel. The complainant was represented by A. G. Safford, and the defendant by Edwin H. Brown.

The said Arthur W. Hendricks was by me carefully examined, cautioned, and duly sworn, according to law, to testify the whole truth touching the matter in controversy, and did depose and say as hereinabove written down.

I am not of counsel for either party to said cause and am not interested in the event of the same.

My commission as notary public expires September 29th, A. D. 1901.

In testimony whereof, I have hereunto set my hand and affixed my notarial seal this 16th day of March, 1900.

[Seal] HENRY W. REED,
Notary Public.

Fees:

Attendance, caption and certificate..	$4.00
Writing down deposition............	2.00
	$6.00

For witness, 2 days' attendance, 400 miles' travel.

[Endorsed]: No. 177. Filed March 20th, 1900. A. L. Richardson, Clerk.

In the Circuit Court of the United States, Ninth Circuit, for the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR
vs.
THE DE LAMAR MINING COMPANY, LIMITED.

Deposition of Cabell Whitehead.

(Before Henry W. Reed, a Notary Public, at Washington, D. C., on the 9th day of March, 1900.)

Appearances:

For the Complainant, A. G. SAFFORD,

For the Defendant, EDWIN H. BROWN.

Cabell Whitehead, a witness produced, sworn, and examined on behalf of the complainant, testified as follows:

(It was orally stipulated in open court by counsel for both parties that the testimony might be taken down stenographically, and after being reduced to typewriting, to be submitted to the several witnesses who might be hereafter examined in the cause, and then subscribed and sworn to, and to be of the same effect as if reduced to writing by the magistrate in the presence of the several witnesses; all objections to this form of recording the testimony being expressly waived by both parties. It was also agreed that the testimony of this witness

(Deposition of Cabell Whitehead.)

might be taken on the 9th day of March, 1900, at the hour and place stated in the notice for the taking of this deposition.)

Prior to the commencement of the examination of the witness, Mr. Edwin H. Brown, counsel on behalf of the defendant, seasonably objected to the taking of the deposition of this witness or of any other witness under the notice served, on the ground that this is not a proper case for the taking of depositions de bene esse, and not within the provisions of the de bene esse statute as provided by Congress for the taking of depositions de bene esse.

Direct Examination.

Interrogatory 1. (By Mr. SAFFORD.) What is your name. age, residence, and occupation?

A. Cabell Whitehead; age, 36; residence, Washington, D. C.; profession, chemist and metallurgist.

2. State your education and experience in your profession.

A. I graduated at Lehigh University in the School of Mining Engineering. My degree is Bachelor of Metallurgy, and I took the Degree of Doctor of Philosophy at Columbian University, first taking a Master's Degree. I have been employed as a chemist about fifteen years, since 1885. I am now assayer of the Bureau of the Mint of the Treasury Department and have been since 1889.

3. What has been your experience with solutions of the cyanide of potassium with reference to the treatment of gold and silver bearing ores?

(Deposition of Cabell Whitehead.)

A. I began experimenting with the cyanide of potash in 1887, before the Forest-MacArthur patents were issued, and at that time had no difficulty in dissolving the gold from ores containing gold in a very finely divided state, but abandoned my experiments after some months' experimentation, because I was unable to cheaply remove the gold from the solutions. These experiments were made at Boise City, Idaho, chiefly on the black sands which occur along the Snake River.

4. What do you know with regard to attempts to use zinc dust as a precipitant for solutions, charged with the precious metals, prior to the Waldstein patent?

A. It had been attempted at one of the Western Metallurgical Works. I do not recall which one, but the matter was fully discussed in a technical paper at the time the experiments were made, and these experiments failed. The attempt was made to filter these solutions through a filter of zinc dust, which very soon clogged and it became impossible to force the solution through and the experiments were abandoned. I do not know of any others on a commercial scale prior to that time.

5. What is zinc dust?

A. Zinc dust as known to the trade is the semi-metallic fume which collects in the nose of the condenser in the ordinary process of producing spelter or metallic zinc. It is an admixture of zinc oxide and metallic zinc, the oxide coating each particle of the metal. It always contains a portion of the volatile impurities occurring in the ore.

(Deposition of Cabell Whitehead.)

6. What is the percentage of these impurities?

A. About one per cent, roughly speaking, I should think; the amount is not constant at all, neither is the percentage of oxygen.

7. Is not the oxide always present to a greater or less degree? A. Yes.

8. What is your opinion as to the comparative efficiency of zinc dust, assuming it to be composed of zinc and zinc oxide, and the use of mechanically divided zinc for the precipitation of gold or silver from their cyanide solutions?

(Objected to because the witness has not been shown qualified to give an opinion in this matter.)

A. In my opinion, it is a more effective means of producing this precipitation, owing to the fact that there is probably an electrical effect produced by the combination of the oxide of zinc and metallic zinc.

9. In the use of zinc in a more massive form and in a quiescent state, as disposed in filtering boxes through which the solution may be caused to be passed, what do you know, if anything, about the formation of hydrogen and its gathering upon the surface of zinc in such a form and give us your opinion as to the effect of that accumulation of hydrogen?

(Objected to as the witness has not been shown to be competent to give the opinion asked for.)

A. I know that hydrogen does accumulate, more or less, upon the filiform zinc when it is acted upon by a cyanide solution, the cause of this accumulation is some-

(Deposition of Cabell Whitehead.)

what in doubt. Some authorities claim that the hydrogen is due to the action of potassium hydrate upon the metallic zinc, while others claim that the reaction is a more complicated one. I do not know just what the effect is beyond retarding precipitation and causing a waste of zinc.

10. In what form, smooth or otherwise, if you know, should the zinc be presented to the solution, in such a way, as to prevent the accumulation of hydrogen on the surface?

A. The filiform zinc should be bright and freshly cut, beyond that, I do not know of any method of preventing this. Of course, if the zinc is smooth, the hydrogen may adhere as an enveloping film of gas, while with the rough zinc, each particle acts as a point of escape for the hydrogen gas.

11. Have you read an article on this subject by Professor Christie, who is said to have made experiments showing the comparative efficacy of zinc in a burnished smooth condition, and zinc with strips of filiform zinc with ragged edges?

A. Yes, I have read that article.

12. To what does he attribute the efficacy of the ragged edge zinc as compared with burnished zinc?

(Objected to as not best evidence.)

A. He holds that the ragged points formed by the cutting tool forms points of escape from the hydrogen gas, whereas, if burnished zinc is used, there is an absence of these points of escape and the zinc may become enveloped in a coating of hydrogen.

(Deposition of Cabell Whitehead.)

13. In the case of zinc dust, how is the zinc oxide disposed?

A. Each article of metallic zinc is surrounded by an envelope you may say, of oxide.

14. And placed in a cyanide solution, what becomes of the oxide?

A. The oxide is dissolved by the action either of the cyanide or free alkali present, leaving the metallic zinc as an irregular mass, presenting a number of points of escape, similar to those described by Christie in the article referred to above.

15. Did you at one time make comparative experiments with the use of zinc dust and mechanically subdivided zinc? A. I did.

16. Do you remember the date?

A. No, I do not.

17. Did you afterwards state in writing the results of these experiments, and did you make affidavit of the same, an affidavit which was, as you understand it, used in the Patent Office when the Waldstein application was being considered there? A. I did.

18. And did you find in these experiments generally that the chemical action of zinc dust in the divided zinc to be the same? A. No, I did not.

19. Speaking in general terms now, what was the difference?

A. The zinc dust was very much more active as a precipitating agent, precipitating, as I remember at present, from eight to ten times as much gold from a solution of given strength in the same length of time.

(Deposition of Cabell Whitehead.)

20. Did you make memoranda of your several experiments at that time? A. Yes.

21. Are these memoranda available at present?

A. My original notes are not now available, but I put my results in the form of an affidavit, which is now on file in the Patent Office, a copy of which is here and to which I now refer.

22. Describe, refreshing your memory from the certified copy of the affidavit, what these experiments were?

A. In the experiments which I detail below I made use of a 4-10 of 100 per cent of solution of zinc potash. I dissolved in this solution approximately 40 milligrammes of gold to a hundred cubic centimetres, 100 C. C. being used for each experiment. The mechanically divided zinc which I used was received from the late Dr. McLean of the Patent Office, and was sent as a sample from a working plant using the Forest-MacArthur process. The following are my experiments:

Experiment 1. 50 milligrammes of zinc dust were added to 100 C.C. solution, containing 40 milligrammes of gold. The solution was agitated for one minute, the solution filtered and the gold precipitated, separated, and weighed. In this experiment 33.3 milligrammes of gold were precipitated.

Experiment 2. 150 milligrammes of mechanically divided zinc were added to the same amount of solution as above and agitated for three minutes. The solution was filtered and the gold separated. The button weighed 3.3 milligrammes. In these two experiments exactly the same conditions existed, except that in the second experiment

(Deposition of Cabell Whitehead.)

filiform zinc replaced the zinc dust of the first experiment. I continued the latter experiment by agitating the filtrate from the solution in which filiform zinc was used with 100 milligrammes of zinc dust for one minute. The solution was again filtered and the gold separated. The button weighed 34.9 milligrammes.

Experiment 3. 100 milligrammes of zinc dust were used with 100 C. C. of the solution. This was agitated for one minute, and the gold button weighed 35 milligrammes.

In another experiment using 100 C. C. of cyanide solution of standard strength, containing 40 milligrammes of gold, 200 milligrammes of mechanically divided zinc were agitated for three minutes. During this time 6.1 milligrammes of gold were precipitated. The filtrate from this experiment was agitated with 100 milligrammes of zinc dust for one minute and a button of gold was recovered weighing 25.5 milligrammes.

From these experiments I was forced to conclude that zinc dust is a very much more effective agent in the precipitation of gold from cyanide solutions than filiform zinc.

23. In the use of zinc dust, supposing it to be used largely in excess, what would be the effect on a cyanide solution charged with the precious metals—how would it leave the solution?

A. As the zinc is soluble in cyanide of potash to a considerable extent, the excess of zinc dust, at least in part, would be dissolved by cyanide, forming cyanide of

(Deposition of Cabell Whitehead.)

zinc, and to this extent, diminishing the percentage of available cyanide present.

24. Supposing it was intended to reuse the solution, what would be the effect of its solvency as to subsequent ores to which it might be presented?

A. I think that question is answered in my answer to the previous question—the amount available would be diminished and the solution injured to that extent.

25. Have you, in addition to the experiments which you have detailed, made other experiments with cyanide solutions?

A. Yes, I have made a very great number of experiments with cyanide solutions.

26. Have you made also other experiments with zinc in various forms for precipitating the values from such solutions?

A. I frequently used the filiform zinc for that purpose, prior to these experiments; since the experiments were made I always use the dust for the purpose of precipitating gold from cyanide solutions.

27. Have you visited cyanide plants where that chemical has been used in extraction processes?

A. Yes, I have.

28. Have you seen such plants in practical operation?

A. Yes.

28. Have you read publications, books, and pamphlets on that subject? A. Yes.

29. Have you examined various patents which have been issued touching that process?

A. I think I have examined them all.

(Deposition of Cabell Whitehead.)

30. Are you yourself a patentee for such processes?

A. Yes, I have some patents bearing on the metallurgy of gold, and one is to be used in connection with the cyanide process.

Cross-Examination.

(By Mr. EDWIN H. BROWN, without waiving any objections.)

XQ. 31. You have spoken of the use of zinc dust as a precipitant for cyanide solutions in one of the Western Metallurgical Works prior to the Waldstein patent—where did this occur?

A. These experiments were made either in Utah or Colorado, I do not recall which State. They were not made upon cyanide solutions, but I think upon hypo-sulphite solutions containing gold and silver.

XQ. 32. Have you any personal knowledge of these uses, or do you depend upon reports for these statements?

A. My authority is an article which appeared in one of the scientific journals.

XQ. 33. Do you remember what one and when it was published?

A. No, I do not now. I think it was the Mining Engineering Journal. I am not quite sure of that.

(All this testimony as to these uses objected as not the best evidence and clearly hearsay.)

XQ. 34. Did you ever analyze zinc dust?

A. I made a qualitative analysis of zinc dust, never a quantitative.

XQ. 35. When?

(Deposition of Cabell Whitehead.)

A. A number of times; once at the time I made this affidavit for Mr. Safford—that is, the affidavit used in the Patent Office.

XQ. 36. What did you find it to be made of?

A. It contained metallic zinc, oxide of zinc, some iron, a residue of insoluble matter, chiefly silicious material. I did not make a very complete analysis and the specimen probably contained besides, some arsenic, and possibly traces of cadmium; they are usually present in the dust as given in the analysis furnished in books upon metallurgy.

XQ. 37. Did you find from your analysis that each particle of zinc dust had an outside coating?

A. No, not from the analysis. An analysis would only show a certain proportion existing as a metal and a certain proportion as an oxide, but from the nature of its formation it must have existed on the outside as the outside surface of the particle of zinc only was exposed to the oxidizing influence.

XQ. 38. Is not this a mere theory—upon what do you rely for this statement?

A. I rely for this statement upon the well-known theories of oxidation. We have present a particle of metal which is surrounded by an oxidizing atmosphere and this oxidation must take place from the outside towards the center of the particle. If the reaction is not complete, it is fair to suppose that there would be a core of metal upon the inside.

XQ. 39. When does the oxidation take place?

(Deposition of Cabell Whitehead.)

A. It takes place at the moment the metallic zinc is volatilized from the retort into the nose in which it is caught. The presence of oxygen there causes the oxidation of the volatilized zinc. When the metallic zinc becomes coated with oxide, it no longer runs into globules, but remains as a powder. If the amount of oxygen present were sufficient, the entire quantity of metallic zinc would be converted into oxide of zinc, but as the oxygen present is only due to leakage of the retort, there is never sufficient oxygen to completely convert all the zinc volatilized into zinc oxide.

XQ. 40. Did you find from your analysis that the amount of zinc oxide in zinc dust varies to a considerable extent? A. Yes.

XQ. 41. What per cent of impurities does zinc dust contain?

A. That is very variable, depending upon the method of production, the ores from which it is made, and a number of other causes.

XQ. 42. From your analysis—what did you ascertain?

A. I made no quantitative examination.

XQ. 43. You have given it as your opinion that zinc dust is more effective as a precipitant for cyanide solutions than mechanically divided zinc, and that this is due to the fact of an electrical effect produced by the combination of the oxide of zinc and metallic zinc—this opinion of yours is mere theory, is it not? Have you ever experimented to ascertain whether it is true?

A. Why, I first made the experiments and ascertained

(Deposition of Cabell Whitehead.)

the fact; then I proposed this theory to account for the fact.

XQ. 44. I do not quite understand your answer.

A. My experiments show that zinc dust is a very much more effective agent than metallic zinc in any form.

XQ. 45. How many experiments did you make in this line?

A. Probably at this time I made a dozen. I have recorded, I think, four here.

XQ. 46. In these experiments, how finely divided was the zinc used?

A. As I stated in my affidavit, it was the filiform zinc, as used in a MacArthur-Forrest plant, the zinc usually used in practical work.

XQ. 47. Can you not answer as to its state of division?

A. The sheets from which it was cut, I should say, were probably the fiftieth part of an inch thick, and the ribbons were probably, say, the thirtieth of an inch wide.

XQ. 48. Now, do you mean to be understood that zinc dust as compared with these filaments of zinc will precipitate ten times the amount of precious metals in the same length of time?

A. I did not say positively ten times as much; I said approximately ten times as much.

XQ. 49. According to your understanding, why does zinc act as a precipitant in cyanide solutions containing precious metals?

(Deposition of Cabell Whitehead.)

A. Because the affinity of cyanogen for metallic zinc is greater than it is for gold, therefore, the cyanogen leaves the cyanide of gold forming cyanide of zinc.

XQ. 50. In your opinion, this reaction will take place more rapidly in proportion to the exposed surface of zinc, will it not? A. Other things being equal, yes.

XQ. 51. Did you ever compare zinc dust as a precipitant with metallic zinc in a very fine state of division, as fine or almost as fine as zinc dust? A. No.

XQ. 52. So far as you know, the alleged advantage of zinc dust as a precipitant may be entirely due to the greater surface of zinc exposed—due to its very fine division—is not this true?

A. I have no evidence to the contrary.

XQ. 53. Is it not your understanding that metallic zinc finely divided and exposed to the atmosphere will oxidize in a comparatively short period, to some extent?

A. Yes.

XQ. 54. Do you believe that it will oxidize to the same extent that zinc dust is oxidized?

A. Under certain conditions it would.

XQ. 55. Is it your understanding that zinc in any form, when used as a precipitant, will dissolve in a cyanide solution after the precious metals have been precipitated? A. Yes, to a certain extent.

XQ. 56. Do you base this opinion upon personal experiments?

A. Rather personal experience than from direct experiments. I have never made any experiments to de-

(Deposition of Cabell Whitehead.)

termine the solubility of zinc in cyanide of potash, though it is a well-known fact that metallic zinc is soluble to a certain extent in cyanide.

XQ. 57. To your knowledge, has this been disputed, and do not experts differ on this account?

A. I never heard that experts differed upon the question of the solubility of metallic zinc in cyanide solutions, but they do differ in regard to the presence of zinc in cyanide solutions which have passed through a precipitating box.

XQ. 58. According to your understanding, is zinc dust a crystalline or amorphous?

A. I do not know which it is.

XQ. 59. Have you in your possession, any zinc dust similar to that used by you in your experiments?

A. Yes.

XQ. 60. Will you produce it?

A. Well, it really belongs to Mr. Safford; if he has no objection, I am willing to give it to you.

XQ. 61. Have you, in your possession, any finely divided zinc, similar to that used by you in your experiments?

A. It is possible I may have some of that yet; these experiments were made two years ago. It is hardly a fair test now to use that, because it has been exposed to the atmosphere, but if I still have it you can have it.

XQ. 62. Why do you think the fact that it has been exposed to the atmosphere would prevent a fair test in its use?

(Deposition of Cabell Whitehead.)

A. Because it is now probably coated to some extent with oxide.

XQ. 63. In your experiments with zinc as a precipitant, how strong a solution of cyanide did you use?

A. Four-tenths of one per cent—approximately that.

XQ. 64. And what as the percentage of gold?

A. Forty milligrammes to the 100 C. C.

XQ. 65. How much would this run to the ton?

A. About 10 or 15 ounces to the ton.

XQ. 66. How does this compare with the usual results in practice?

A. A solution as rich as this would not be obtained except in working very rich ores.

XQ. 67. Will you please ascertain whether or not you have any zinc dust similar to that used in your experiments, and any of the finely divided zinc, and advise me?

A. Yes, if I find it, I will put it in a little vial, and mark it, and attach it to the deposition.

CABELL WHITEHEAD.

By agreement of counsel all objections to form of caption and certificate were waived for depositions of Martin E. Waldstein, David K. Tuttle, Charles E. Munroe, Arthur W. Hendricks and Cabell Whitehead.

United States of America, }
District of Columbia. } ss.

I, Henry W. Reed, a notary public within and for the District of Columbia, hereby certify that on the 9th day of March, A. D. 1900, by agreement of parties, at room No. 3, 1416 F street, N. W., in the city of Washington, in said District, at ten o'clock A. M., was produced and personally came before me as such notary public, Cabell Whitehead, a witness on behalf of the complainant, to depose in a certain civil cause depending in the Circuit Court of the United States (Ninth Circuit), sitting in equity, for the District of Idaho, wherein Joseph R. De Lamar is the complainant, and the De Lamar Mining Company, Limited, is the defendant, and whose testimony is alleged to be competent and material in said civil cause on behalf of the complainant.

The cause for taking this deposition is the fact that the said witness resides more than one hundred miles from the place of trial of said cause and more than one hundred miles from any place at which a Circuit Court of the United States for the District of Idaho, is appointed to be held by law.

This deposition being taken in accordance with the annexed citation; the adverse party was duly notified and attended the taking of said deposition, by counsel. The complainant was represented by A. G. Safford, and the defendant by Edwin H. Brown.

The said Cabell Whitehead was by me carefully examined, cautioned and duly sworn, according to law, to testify the whole truth touching the matter in controversy, and did depose and say as hereinabove written down.

I am not of counsel for either party to said cause and am not interested in the event of the same.

My commission as notary public expires September 29th, 1901.

In testimony whereof, I have hereunto set my hand and affixed my notarial seal, this 16th day of March, A. D. 1900.

[Seal] HENRY W. REED,
Notary Public.

Attendance, caption and certificate..	$4.00
Writing deposition	2.00
	$6.00

Witness: Attendance, 2 days; travel, 1 mile.

[Endorsed]: No. 117. Filed March 20th, 1900. A. L. Richardson, Clerk.

In the Circuit Court of the United States, for the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR

vs.

THE DE LAMAR MINING COMPANY, LIMITED.

Deposition of Charles E. Munroe.

(Before Henry W. Reed, Notary Public, at Washington, in the District of Columbia, February 27, 1900, and March 9, 1900.)

Appearances:

For the Complainant. A. G. SAFFORD.

For the Defendant, EDWIN H. BROWN.

Charles E. Munroe, a witness produced, sworn, and examined on behalf of the complainant, testified as follows:

(It was orally stipulated in open court by counsel for both parties that the testimony might be taken down stenographically and after being reduced to typewriting, to be submitted to the several witnesses who might be hereafter examined in the cause and then subscribed and sworn to, and to be of the same effect as if reduced to writing by the magistrate, in the presence of the several witnesses; all objections to this form of recording the testimony being expressly waived by both parties.)

(Deposition of Charles E. Munroe.)

Prior to the commencement of the examination of the witness, Mr. Edwin H. Brown, counsel on behalf of the defendant, seasonably objects to the taking of the deposition of this witness or of any other witness under the notice served, on the ground that this is not a proper case for the taking of depositions de bene esse, and not within the provisions of the de bene esse statute, as provided by Congress for the taking of depositions de bene esse.

Direct Examination.

Interrogatory 1. (By Mr. SAFFORD.) What is your name, age, residence, and profession?

A. Charles E. Munroe; age, 50; residence, Washington, D. C.; Professor of Chemistry in the Columbian University of this city.

2. Please state your experience in your profession.

A. I was graduated from Harvard University in Chemistry in 1871; I taught chemistry in Harvard University from 1871 to 1874; was Professor of Chemistry at United States Naval Academy from 1874 to 1886; Chemist of the United States Naval Torpedo Station and War College from 1886 to 1892; Professor of Chemistry at the Columbian University of this city from 1892 to the present time, which position I still hold. I have been President of the Washington Chemical Society; President of the Chemical Section of the American Association for the Advancement of Science; President of the

(Deposition of Charles E. Munroe.)

American Chemical Society, the National Organization of Chemists, and served as expert in many causes.

3. Have you made yourself familiar with the use of solutions of cyanide for the purpose of extracting the values from ores?

A. I have been consulted by attorneys and inventors in regard to different steps in the development of the cyanide process for the extraction of the precious metals from their ores and have followed the literature of the development of this process and have practiced experiments to enable me to render advice on the points sought.

4. Have you become acquainted with the process patented by Dr. Waldstein of New York for the recovery of such metals from their cyanide solutions? If so, state generally what that patent is.

A. I, some four years ago, was employed to examine the application for this patent when before the office, and I then made myself familiar with the claims of the applicant and his method of operation. The process in general was that for the precipitation of the precious metals dissolved by the cyanide solution by the use of zinc dust by agitation.

5. Please state what zinc dust is—how manufactured, etc.

A. Zinc dust is the finely granulated material, consisting of zinc and oxide of zinc, which is produced during the distillation of zinc from its ores, the zinc being volatilized and condensed, condensing upon the cooler

(Deposition of Charles E. Munroe.)

part of the condenser in this finely divided state, and in contact with the air, this finely divided material rapidly becomes oxidized upon its surface. The process for its production is analagous to that for the production of flowers of sulphur, and hence the propriety of the term, "flowers of zinc," which is sometimes applied to this material.

6. How is this zinc dust or flowers of zinc ordinarily produced?

A. It is produced incidentally in the distillation of the zinc from its ores, and is deposited in the prolongation of the condensers, and is a material which is a troublesome one from which to produce the metallic zinc in a marketable shape owing to the fact of the rapidity with which it burns.

7. Please describe the reaction of zinc with potassium cyanide and other cyanide solutions.

A. It will be impossible for me to state from memory, as I have not recently refreshed my memory, in regard to the exact products of the zinc with the potassium cyanide, but as nearly as my memory serves, the result would be the production of potassium zinc cyanide.

8. Is that soluble or insoluble in the menstruum present?

A. It would be soluble in the menstruum present.

9. Does the solution, where zinc dust is used, take place slowly or with rapidity?

(Deposition of Charles E. Munroe.)

A. The solution with zinc dust takes place very promptly.

10. And what results to the cyanide solution under these circumstances?

A. I would like to inquire whether you refer to the potassium cyanide, pure and simple?

11. Yes, to potassium cyanide and other cyanide solutions; with that understanding, what is your answer to my question?

A. In the case of the potassium cyanide solution per se, the potassium zinc cyanide goes into solution; in the case where these potassium cyanide solutions contain precious metals having formed the double cyanide, the zinc displaces the gold and the silver in solution, causing their precipitation.

12. In the use of zinc dust as a precipitating reagent in the case of cyanide solutions, charged with the precious metals, state whether or not, it would be practical to cause such solutions to percolate through the precipitant?

A. The use of this material in the finely divided state, as a medium through which percolation is to take place, would be attended with practical disadvantages, owing to the extreme fineness, so that in practice it would be found unfit, in my judgment, for use in that way.

13. Suppose that the zinc dust was dispersed through the solution by agitation, what would be the effect of

(Deposition of Charles E. Munroe.)

an excess of the precipitating material, where it was intended to use the material over again in dissolving the precious metals of other bodies of ore?

A. The effect of the excess of the zinc dust would be to destroy the solvent power of a certain amount of the potassium cyanide for the precious metals, and therefore to the extent in which it would be in excess, to diminish the use again of the cyanide as a solvent for the precious metals.

14. If you remember, state how Dr. Waldstein meets these practical difficulties in the way of the use of zinc dust.

A. As I have not seen a copy of Dr. Waldstein's application for patent since 1896, I do not wish to trust my memory in that regard.

15. In your opinion, would the mechanical difficulty in the way of causing the solution to flow through the body of zinc dust, be obviated by causing that material to be dispersed through the body of the solution by agitation? A. Undoubtedly.

16. Would the chemical difficulty of the tendency of the zinc dust to become incorporated into the cyanide solution be obviated by predetermining the amount necessary to effect through precipitation by using only that sufficient amount?

A. Undoubtedly, the use of the zinc dust to a definite and predetermined amount would obviate the chemical difficulty of destroying the cyanide solution as compared

(Deposition of Charles E. Munroe.)

with the use of the finely divided zinc as a medium through which the solution is to percolate.

17. Please examine what purports to be a copy of your former affidavit, and answer this question: Do you remember that about the time of making that affidavit, there were shown to you what was said to be extracts from the English patent of Astley Price, relating to precipitation and solution?

A. I do remember that a paper showing such extracts was submitted to me at that time.

18. Assuming that that patent referred to the use of zinc or other metal in a "fine state of division," state whether or not, in your opinion, Price could have intended to use zinc dust for the purposes indicated.

A. In my judgment, he could not have intended to use zinc dust, according to the language quoted in the extracts, for the zinc dust, as I have before stated, is a composite substance; it is something more than a metal in a state of fine division, it is a metal and an oxide of a metal which has been produced by the process of sublimation, whereas, the custom has been heretofore that the metals as used in a state of fine division were obtained in this state of fine division by mechanical processes, such as turnings or chips, or the material granulated by fusion and precipitation or by reduction of the material by the aid of reducing agents from its state of combination.

19. Are you somewhat familiar with the history of the use of zinc as a precipitant for cyanide solutions charged

(Deposition of Charles E. Munroe.)

with the precious metals, and judging from the literature on the subject, was it considered practical to use zinc dust as such precipitant as late as October, 1894?

A. I have at times made myself particularly acquainted with the use of zinc in its various conditions for the precipitation of gold from cyanide solutions, particularly as I was asked by counsel to give an opinion upon the use of Flossy zinc in one of the McArthur-Forest suits, and later, when this matter was under consideration, I reviewed the history of the art as laid down in the books, and then observed again as late as October, 1894, that the use of zinc dust for this purpose was considered impracticable.

20. Describe the practical use of flossy or filiform zinc in obtaining the precipitation of gold and silver from cyanide solutions.

A. The zinc in filiform condition was used as a percolating medium through which the cyanide solution containing precious metals was percolated so that at the time they underwent reduction the precious metals being replaced in solution by zinc. The issue at that time, as nearly as I now recall it, was that the use of zinc in such filiform condition constituted no novelty over the use of zinc in plates or strips as it had previously been used. I pointed at that time that zinc produced by the turning of thin shavings from zinc ingots or bars was a different thing from zinc in the mass, and would operate differently because of the difference in its mechanical condition and my position has been fortified by the thorough

(Deposition of Charles E. Munroe.)

investigation made by Professor Christie, in which he ascertained that the peculiarly abraded surface, tooth-like surface, given to these shavings in the turning, facilitated the action of the zinc by allowing the liberated hydrogen to escape from the innumerable points, whereas, where the zinc had been used in mass, the hydrogen accumulated as a film upon the surface, and thus arrested its further action, or at least retarded the rapidity with which it would act.

21. State whether, in your opinion, electrolysis figures in the precipitation of the precious metals in the presence of zinc?

A. It does. The precipitation is due to an electro-chemical change.

22. In your opinion, does zinc dust present itself to such a solution in a form tending to produce that electro-chemical charge.

A. It does, in my opinion; it possesses the distinct advantage in that we have present in the solution not only zinc in a metallic condition, but also zinc oxide.

23. Which one of these is electro-positive and which electro-negative?

A. The zinc will constitute the negative and the zinc oxide the positive electrodes in such a combination.

24. In your affidavit, in regard to the Astley Price English patent, you formerly gave an additional reason for your statement that he could not have intended the use of zinc dust, because he also speaks of the "excess of precipitant"; would there be such excess, if he had contemplated the use of zinc dust?

(Deposition of Charles E. Munroe.)

A. My affidavit referred to the use of zinc dust as employed by Waldstein, and it is evident, in speaking of there being an excess of the precipitant, that Price could not have contemplated the use of zinc dust as it is directed to be employed by Waldstein.

(By agreement of counsel, the examination of the witness was suspended at this point, to be resumed at 10 o'clock A. M. on Friday, the 9th day of March, 1900, at the same place.)

(By agreement of parties the further examination of this witness was continued to March 9, 1900, same hour and place.)

Room 3, 1416 F street, 10 A. M., March 9, 1900.

The examination of CHARLES E. MUNROE resumed.

Cross-Examination.

(By EDWIN H. BROWN, without waiving any objections.)

XQ. 25. Your use of solutions of cyanide for extracting the precious metals from ore has been experimental rather than practical, has it not?

A. My use of cyanide solutions has been confined to the laboratory for experimental purposes.

XQ. 26. You have never acted as a patent expert, have you?

A. I have been employed as an expert in suits covering patents and as a consulting expert by patent attorneys in the securing of patents where an application was under consideration, and at other times. That has been my connection with patents. I do not understand

(Deposition of Charles E. Munroe.)

your question otherwise as to what a patent expert may be.

XQ. 27. Have you ever acted as an expert to define what is contained in a patent, and compared that with an alleged infringement?

A. Yes, I have been employed in suits brought for infringement and in interference cases, and have been called upon by counsel to compare the specifications and claims of the patent in suit or of the interfering applications in suit.

XQ. 28. Do you mean to be understood that such examinations have been confined to interference cases?

(Question objected to as being obscure.)

A. I have been employed both in cases of interference and in cases of alleged infringement.

XQ. 29. In what cases of alleged infringement have you acted as expert?

A. The first that comes to my mind was the Nickel Plating case; the second which I recall was the infringement of the Schrader patent for the manufacture of an explosive, and the third case I recall was the Latent Liquid Solvent case. I do not at this time recall others. These are the ones that come to my mind now.

XQ. 30. Can you recall the title of any one of these cases—that is to say, who was the complainant and who was the defendant?

A. In the Schrader case, so well as my memory serves me, it was The Atlantic Dynamite Company against a powder company in Western Pennsylvania, though the name of that company has now passed from my mind.

(Deposition of Charles E. Munroe.)

In the Latent Liquid Solvent case, as I recall it, it was the Celluloid Company vs. The Arlington Manufacturing Company, though the latter company was also known as the Cellonite Company. In the Nickel Plating case, as well as my memory serves me, it was the United States Nickel Plating Company vs. Fletcher.

XQ. 31. In any one of these cases did you act as expert to define the patented improvement, and compare it with the alleged infringement, or did you act merely as an expert in chemistry?

A. I acted as a chemical expert, but the interrogatories put to me required me to compare what was accomplished by the alleged infringer, or what was performed by the alleged infringer, with what has been granted to the patentee under the patent issued to him, and I was required to read the claims and specifications of the patent and to point out wherein the alleged infringement did or did not conform to the claims and specifications of the patent.

XQ. 32. Have you any personal knowledge of the manufacture of zinc dust as distinguished from knowledge acquired from text-books or reports?

A. My knowledge has been acquired from text-books and reports and from personal conversation with the manufacturer.

XQ. 33. Did you ever analyze zinc dust?

A. I do not recollect having made an analysis of zinc dust.

XQ. 34. In answer to question 7, you say "Potassium

(Deposition of Charles E. Munroe.)

zinc cyanide is soluble in a menstruum present"—is this statement made from personal knowledge gained through actual tests?

A. My knowledge is based on the observation that on the addition of zinc to the potassium gold cyanide solution, using a minute quantity of zinc, that the material went into solution; my knowledge of the existence of potassium zinc cyanide is not based on analysis, but on the statement of the books.

XQ. 35. You have answered that where zinc dust is used the solution takes place very promptly—is this statement based upon tests of your own.

A. I do not recall making such a statement.

XQ. 36. Does the solution, where zinc dust is used, take place slowly or with rapidity, where used with potassium cyanide and other cyanide solutions?

(Question objected to as not stating what kind of a cyanide solution is intended.)

A. I have personally made no comparative tests. I have known of their being made, and the result was that the solution takes place with promptness and rapidity.

(Answer objected to as far as it relates to his alleged knowledge of tests by others as hearsay and not the best evidence.)

XQ. 37. Do you mean to be understood that you have never used zinc dust for precipitating the precious metals from cyanide solutions?

A. No, I do not, because I have made tests, but I have made no comparative tests.

(Deposition of Charles E. Munroe.)

XQ. 38. What do you mean by comparative tests?

A. I mean making tests in which I use the zinc dust, side by side with other forms of zinc, using similar solutions as regards strength, temperature and other conditions.

XQ. 39. You say that the use of an excess of zinc dust in such solutions would act to destroy the solvent power of the solution—is this statement based on actual tests of your own? A. It is not.

XQ. 40. On what is it based?

A. It is based on the fact that the presence of zinc tends to the production of potassium zinc cyanide, which is not a solvent for precious metals.

XQ. 41. In your last answer, you have practically repeated your former statement. Did you rely upon personal tests in making your last answer?

A. I did not. I rely upon my general chemical knowledge of the behavior of these substances.

XQ. 42. In answer to question 17, you examined what purported to be a copy of a former affidavit by you. Have you this affidavit present?

A. Yes, it is within my reach.

XQ. 43. In answer to question 18, you say, "The custom has been heretofore that the metals as used in a state of fine division were obtained in this state of fine division by mechanical processes, such as turnings or chips, or the material granulated by fusion and precipitation or by reduction of the material by the aid of reducing agents from its state of combination." Do you state

(Deposition of Charles E. Munroe.)

this from actual knowledge, or do you rely upon text-books?

A. I rely upon text-books and other literature, patents, and so on.

XQ. 44. And your knowledge of the history of the use of zinc as a precipitant is based upon what you have obtained from text-books and other literature, is it not?

A. Except so far as I have, in laboratory experiments, employed zinc as a precipitant, it is based upon literature. I do not profess to have practiced the art.

XQ. 45. And in your laboratory experiments, you have followed the text-books and literature, I suppose?

A. I have so done.

XQ. 46. Did you ever experiment with the use of zinc shavings as a precipitant in cyanide solutions containing precious metals?

A. No, I have not used what are known in the art as zinc shavings.

XQ. 47. Is it your opinion, that in the use of zinc as a precipitant of precious metals in cyanide solutions, that the precipitation is due to electro-chemical change.

A. According to one of the chemical theories, it is; according to another, it is due to substitution, but we speak of the electro-positive element replacing the electro negative element in a state of combination, and according to that electrical theory, it is an electro-chemical change.

XQ. 48. Whatever position you take in this matter is based upon the literature in the art, instead of experiments by yourself—is it not?

(Deposition of Charles E. Munroe.)

A. As concerns experiments made in this particular art, yes, but as concerns repeated experiments which I have made in the past, no.

XQ. 49. What do you refer to when you speak of experiments made in the past?

A. That as regards the application of the theory to the art, I base my opinion upon experiments made in the deposition of silver from silver salts by the aid of zinc, or deposition of copper from copper salts by the aid of iron, and the deposition of lead from lead salts by the aid of zinc, and numerous other experiments which I have made in my lectures and produced in the laboratory.

XQ. 50. Is it your opinion that zinc dust tends to produce such an electro-chemical change when used in cyanide solutions?

A. It is my opinion that we have there the additional effect of having two different substances, zinc oxide and the zinc, and under these circumstances we may have what is an electric couple.

XQ. 51. And this opinion, as I understand, is based upon experiments not practiced in the art, but on those you have already described?

A. Upon those and others, as for instance, in the case of the corrosion of the copper sheathing of vessels, which I was directed by the Secretary of the Navy to investigate, and wherein I found the cause of corrosion to be due to the presence on the copper of the oxide of copper, through which an electro-chemical couple was formed in the salt water, and thus the active corrosion of the copper was brought about.

(Deposition of Charles E. Munroe.)

XQ. 52. Is this theory of yours based to some extent on the understanding that zinc dust is composed of zinc and zinc oxide? A. It is.

XQ. 53. And do you rely for your knowledge of the composition of zinc dust upon text-books?

A. I do.

XQ. 54. Is it not your understanding that other metals beside zinc are contained in zinc dust?

A. It is, and in stating that zinc dust is composed of zinc and zinc oxide, I use the word "zinc" in its commercial sense.

XQ. 55. What other metals besides zinc are contained in zinc dust?

A. I understand that cadmium may be present, and that arsenic, which is sometimes called a metal, may be present.

XQ. 56. Anything else?

A. There may be other elements present, depending upon the ore from which the zinc is distilled; there would probably be some iron present.

XQ. 57. According to your understanding, are these particles of zinc dust crystalline or amorphus?

A. I have never observed them under the microscope, but as observed by the naked eye, I have never seen them to have a crystalline form.

XQ. 58. For how many years to your knowledge has zinc dust been on the market?

A. I cannot state; I have known of it for a great many years, but cannot state as to whether it has been

(Deposition of Charles E. Munroe.)

sold in the market or not. I can recall making purchases of it only in recent years, as previously it was provided for me.

XQ. 59. Have you ever experimented with zinc dust as a precipitant for precious metals in cyanide solutions?

A. I have, they amounted to nothing, because they were made simply on a qualitative scale.

XQ. 60. Have you ever experimented with zinc in any form as a precipitant for precious metals in cyanide solutions? A. Only in the same way as with zinc dust.

XQ. 61. So you do not feel qualified to testify as to the practical use of zinc as a precipitant in cyanide solutions?

A. I have before stated that I have not practiced the art, and consequently do not qualify to testify as an expert of the practice in the art.

Redirect Examination.

(By Mr. SAFFORD.)

RD. 62. You have spoken of having been employed in certain specified cases which were pending either before the Patent Office, or in court; have you or have you not been consulted with reference to the use of cyanide solutions in matters other than those where there was litigation pending, and in cases where litigation was expected?

(Objected to as immaterial. Whether he has or not, will not qualify him to act as an expert in this art.)

A. I have been consulted in the case of the use of fili-

(Deposition of Charles E. Munroe.)

form zinc as compared with zinc in other conditions, in a case where I was not aware whether litigation was pending or not, or to be, but consulted by counsel as to whether, in my opinion, as a chemist, there was a distinction between filiform zinc and sheet or granulated zinc in its use in cyanide solutions.

RD. 63. At the time you were so consulted, did you make a special examination of the subject?

A. I did, in its literature.

RD. 64. And did you report to your employers the result of your investigation? A. I did.

RD. 65. Do you remember with reference to what particular patent your advice was then sought?

A. As I recall it, it was in the MacArthur-Forrest patent.

RD. 66. In speaking of experiments of others, with regard to the comparative use of zinc in a more or less massive form, and zinc dust, were you made acquainted with certain experiments said to have been made by Dr. Whitehead with those differing forms of precipitants?

(Objected to as immaterial and indefinite.)

A. It was to those experiments that I referred.

RD. 67. Were you informed that he had made several experiments, using a cyanide solution of the same strength, in which was dissolved a certain definite quantity of gold, and that using at different times different portions of this same solution, he had treated the differ-

(Deposition of Charles E. Munroe.)

ent parts at one time with zinc dust, and at another with filiform zinc, with the result—

(Objected to as immaterial. The witness' information relating to this is entirely unimportant.)

—that the precipitation took place in the case of zinc dust with promptness and rapidity, as compared with the use of metallic zinc?

(Objected to as immaterial. The witness' information relating to this is entirely unimportant.)

A. At the time when he was making the experiments I was aware that it was being done, and I was aware that he had obtained results showing the higher efficiency of the zinc dust, but I was not then acquainted with the details of his experiments. Subsequently I became acquainted with the details through the reading of his affidavit.

(Answer objected to as far as it relates to the results of Dr. Whitehead's experiments as purely hearsay.)

RD. 68. Referring to question 17, is the following a copy of the paper which I showed you at the time you made your affidavit with reference to Price's English patent and made a part of your affidavit filed in the Patent Office?

"Astley P. Price, English Patent, 1883, No. 5. 125.

In carrying out the first part of my invention, the ores are reduced to a state of fine division, and are subjected to a keeping and calcining process with salt or with other chlorides, and the resulting product is then submitted to the action of water, or a solution of an acid,

(Deposition of Charles E. Munroe.)

for example, as hydro-chloric acid, or to the action of a solution of salt or other chloride, or to the action of an acid, such for example, as hydro-chloric acid in conjunction with the solution of common salt, or other chloride, and the solution thus obtained is separated from the insoluble residue and is treated in the following manner.

"To the solution, the same by preference at an elevated temperature, zinc or other metal, other than copper, which is capable of precipitating gold or silver from solutions, such metal being by preference in a fine state of division, is to be added, and then after agitation and incorporation and precipitation of the precious metal or metals, together with any excess of the precipitant, is allowed to subside and the supernatant solution is separated either by decantation or filtration.

"After such precipitation, the precipitate, together with any excess of the precipitant or other metals, may be treated by any well-known method in order to obtain the gold or silver, or the silver and gold therefrom.

"Note.—The complete specification differs materially from the above in that it provides for the incorporation of the precipitant either by the injection of steam or air."

A. It is.

CHARLES E. MUNROE.

United States of America, } ss.
District of Columbia. }

I, Henry W. Reed, a notary public within and for the district of Columbia, hereby certify that on the 27th day of February, A. D. 1900, at room No. 3, 1416 F Street, N. W. in the city of Washington, in said District, at 10 o'clock A. M. was produced and personally came before me as such notary public, Charles E. Munroe, a witness on behalf of the complainant to depose in a certain civil cause depending in the Circuit Court of the United States (Ninth Circuit), sitting in Equity for the District of Idaho, wherein Joseph R. De Lamar is the complainant and the De Lamar Mining Company, Limited, is the defendant, and whose testimony is alleged to be competent and material in said civil cause on behalf of the complainant.

The cause for taking said deposition is the fact that the said witness resides more than one hundred miles from the place of trial of said cause, and more than one hundred miles from any place at which a Circuit Court of the United States for the District of Idaho is appointed to be held by law.

This deposition being taken in accordance with the annexed citation, the adverse party was duly notified and attended the taking of said deposition, by counsel.

The complainant was represented by A. G. Safford, and the defendant by Edwin H. Brown.

The said Charles E. Munroe was by me carefully examined, cautioned and duly sworn, according to law, to testify the whole truth touching the matter in controversy, and did depose and say as hereinabove written down.

I am not of counsel for either party to said cause and am not interested in the event of the same.

My commission as notary public expires September 29th, 1901.

In testimony whereof, I have hereunto set my hand and affixed my notarial seal this 16th day of March, A. D. 1900.

[Seal] HENRY W. REED,
Notary Public.

Fees:

Attendance, caption and certificate...	$4.00
Writing down deposition............	2.16
	$6.16

Witness: Attendance, 3 days; travel, 1 mile.

[Endorsed]: No. 177. Filed March 20th, 1900. A. L. Richardson, Clerk.

In the Circuit Court of the United States for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR, Complainant, vs. THE DE LAMAR MINING COMPANY, LIMITED, Respondent.	No. 177.

Deposition of V. B. Sherrod.

United States of America,
District and State of Utah,
City and County of Salt Lake. } ss.

Depositions of witnesses taken on the third and fourth days of May, 1900, on behalf of the complainant, before me, John W. Christy, a Commissioner appointed by an order made by said Court pursuant to a stipulation made by said parties, said Commissioner being deputy clerk of the United States Circuit and District Courts for the District of Utah, at the office of the clerk of said Court, at Salt Lake City, in said District and State of Utah, in Salt Lake City, in a certain suit now pending and undetermined in the Circuit Court of the United States for the District of Idaho, Ninth Circuit, Central Division,

(Deposition of V. B. Sherrod.)

wherein Joseph R. De Lamar is complainant, and The De Lamar Mining Company, Limited, is respondent, A. C. Ellis and A. G. Safford, solicitors and counsel for complainant, appearing for complainant, and John H. Miller, Esq., appearing as solicitor and counsel for respondent.

At said hearing, and before the commencement of the examination of the respective witnesses, it was stipulated by and between said parties that the testimony should be taken down in shorthand and reduced to typewriting, and submitted to the respective witnesses and subscribed by them either in or without the presence of counsel and the Commissioner.

Mr. V. B. Sherrod, a witness produced, sworn, and examined on behalf of the complainant, testified as follows:

Direct Examination.

(By Mr. A. C. ELLIS.)

Q. What is your name, Mr. Sherrod, and age and business or profession?

A. V. B. Sherrod; thirty years of age; metallurgical chemist.

Q. Have you studied chemistry and the art of metallurgy at any institution of learning and if so what?

A. I have. I studied three years at the University of Michigan.

Q. What particular branch did you study at the University of Michigan?

(Deposition of V. B. Sherrod.)

A. I was a candidate for the Degree of Bachelor of Science in Chemistry, and took the regular course pursuant thereto during the time I was there and up to the time I left.

Q. When did you leave the University?

A. 1890, at the end of the calendar year.

Q. In what business have you been since then?

A. As an analytical chemist during the entire time since then.

Q. At what place, Mr. Sherrod?

A. During about nine years of that time in the Lake Superior Mining District at Ironwood, Michigan, and for seven months in the Republic of Mexico, and about the same time in the Cripple Creek district in Colorado.

Q. Have you given your attention to the study of metallurgy during that period? A. *As an, yes.*

Q. What business did you say you are engaged in now?

A. I am now engaged as chemist at the Golden Gate Mill of the De Lamar Mining Company at Mercur.

Q. In this State? A. In Utah.

Q. How long have you been engaged in that capacity? A. Since February 15th of this current year.

Q. You may state what the magnitude of this metallurgical establishment connected with that institution is, and what is its capacity?

A. The capacity of the mill as it is being operated at present is from seven hundred and fifty to a thousand

(Deposition of V. B. Sherrod.)

tons per day, depending upon the character of the ore treated.

Q. Are you familiar with the process employed at that mill to reduce the ores to bullion?

A. I am.

Q. What character of ore is there treated? I mean by that as to whether it is gold or silver ore or lead or copper, or what?

A. The ore is a gold ore containing very small quantities of silver, practically traces.

Q. What process is employed to extract the gold from the ore?

A. What is known as the cyanide process of extraction.

Q. Has the tonnage which you have stated been put through that mill or substantially so since your employment there, from the beginning? A. It has.

Q. You may describe, as briefly as you can, the process of extracting the gold from the ores of that property.

A. The practical treatment of the ore consists in first crushing all grades of ore treated through crushers and rolls, reducing each kind of ore to the proper size for subsequent treating, and roasting the ores containing unoxidized iron and sulphides, and calcining the ores which need to have the water driven off for the purpose of facilitating the leaching, and treating of these ores in leaching vats or tanks with a solution consisting of cya-

(Deposition of V. B. Sherrod.)

nide of potassium and caustic soda, as described below. The first solution employed upon these ores contains about four-tenths of one per cent of cyanide of potassium and thirty-five one hundredths (35 per cent) of one per cent of caustic soda, and is applied at the bottom of the tank through pipes leading to the bottom and connecting with the bottom, and is allowed to fill up to the surface of the ore by the force of gravity, the tank from which this solution comes being set about twenty feet above the leaching floor. It requires about eight hours for this solution to reach the surface of the tanks, and it is allowed to stand there covering the surface of the ores for twenty-six to forty-eight hours.

Q. What is the thickness or depth of the ores in the tanks which you have described and what is the size of the tanks?

A. The tanks are twenty-five by fifty and about four and a half feet in depth above the filter bed, and the ore is filled in to a depth of a trifle more than four feet.

Q. That is all. Go on now where I interrupted you.

A. After the first solution has remained on the ore for from twenty-six to forty-eight hours—

Q. To make it clear, you spoke of the introduction of the solution by pressure. When it covers the surface of the ore—

A. We stop it then by closing the valves in the pipes leading to the bottom of the tanks. The filtration or percolation is allowed to go on at this point and as rapidly as the solution filters below the surface of the ore,

(Deposition of V. B. Sherrod.)

it is allowed to fill up by a solution of the same strength applied from pipes on the top of the tank, thus keeping the ore at all times covered with this solution. After this leaching process has continued for about twenty-four to forty-eight hours longer a weaker solution of cyanide and sodium are employed or substituted rather containing about three-tenths of one per cent of cyanide and about three-tenths of one per cent of caustic soda. The object of the second solution is partially to wash off the stronger solution and the values and complete the solution of the gold which has not been previously dissolved. After about thirty-six hours of washing with the weak solution applied from the top, clear water is substituted applied in the same manner. Enough water is applied to the surface of the ore to replace the amount of the solution that would be employed by the tailings as moisture when the tanks are discharged. This amounts to about twenty per cent of the weight of the ore in the tank. That is in about two hundred fifty tons of ore, about fifty tons are required to wash out and replace as far as possible the values in gold and chemicals still left in the tank. And all these solutions which pass through the ores are filtered through a canvas and gravel combination filter in the bottom of the tank and pass through outlets at the bottom and are conducted through iron pipes to the tank known as the pregnant solution tank. The extraction of the values from the solutions is made as follows: Tanks known as precipitat-

(Deposition of V. B. Sherrod.)

ing tanks are provided which are about twelve feet in depth and of sufficient diameter to hold about thirty tons of the solution. As soon as there is an accumulation of pregnant solution in the pregnant solution tanks, about twenty-eight tons of this solution approximately are pumped into the precipitating tanks.

Q. The pregnant solution is lower than the precipitating tank?

A. Yes; I guess it is the exigency of the occasion, not necessarily. At the same time that the solution begins to flow into the precipitating tanks, a definite amount of zinc dust in small portions at a time is scattered over the surface and during the time the pumping of the solution into this precipitating tank continues a stream of air is blown into the tank through a pipe, the inside diameter of which is approximately five-eighths of an inch, and under a pressure of about twenty pounds to the inch. This air pipe is swung from one side to the other of the tank in order to thoroughly agitate the entire solution to keep the zinc dust in suspension and as thoroughly mixed with the solution as possible.

Q. As the zinc dust is introduced and as the solution flows into the tank?

A. Yes, sir. The time required to fill these tanks and during which the air is forced into the tanks is about sixteen minutes. At the end of this time the pumping is stopped.

Q. The pumping of what?

(Deposition of V. B. Sherrod.)

A. The pumping of the solution is stopped and the air supply is cut off, and the precipitate of gold is allowed to settle to the bottom of the tank.

Q. How long do you let it rest in practice?

A. I could not state how long it is allowed to rest in practice. It depends somewhat upon conditions about the precipitating room. That is the time the attendants have to attend to it, but I should say from four to six hours.

Q. Well, sir, go on.

A. As soon as this settling process is partially or nearly completed, the supernatant liquid is drawn from the tank, leaving as far as possible the precipitate of gold in the bottom of the tank. This solution is allowed to flow through the filter presses for the purpose of catching any fine gold or zinc in suspension, and from the filter presses flows into what is known as the lower sump or storage tank. This solution is pumped back to the strong solution tank and restandarized to proper strength and is used over in the same process.

Q. Pumped back to the point from which it started?

A. Yes, sir.

Q. You use the expression that the solution containing gold is passed through the—is permitted to flow through the filters. I wish you would make it a little clearer what you mean by the filters. Explain how the filters treat that solution carrying the suspended gold.

A. These filters or filter presses, so called, are—

(Deposition of V. B. Sherrod.)

Q. Just briefly to put the Court into possession of what you mean by filters.

A. Simply well-known types of filters and the filters themselves consist of one thickness of woven cloth with a very loose nap—it is canton flannel—and one thickness of heavy filter paper and another thickness of canton flannel, the paper being between the two thicknesses of flannel.

Q. It just flows through or is passed through as it comes from that tank?

A. The solution passes through the filters and the precipitate is retained.

Q. Now, go on.

A. At the end of the month or—

Q. Now, that we may all understand that; you have the solution in which the gold has been precipitated through the tanks and back to where it started. Now, deal with the precipitate in the precipitating tank.

A. At the end of the month or other regular time for cleaning up and refining, the precipitate is collected from the bottom of the precipitating tank and the filters are removed from the presses and cleaned—that is, the precipitate is removed from them, and this entire product is refined as follows.

Q. Do you take that precipitate of gold and put it into the filter presses?

A. Yes, these filters, so called, or filter presses, technically. That is where the gold is collected or a portion of it.

(Deposition of V. B. Sherrod.)

Q. Added to that which has been caught by the solution presses?

A. In the precipitating tank. The solution presses are the filter presses. This precipitated gold and its impurities are dried in a muffled drying furnace to expel moisture, and crushed to a moderate degree of fineness, and mixed for sampling purposes, and then it is treated in a large tank with a lead lining.

Q. Put into that?

A. Yes, sir, it is a wooden vat lined with lead. This treatment consists in dissolving the impurities contained in the precipitated gold in a dilute solution of sulphuric acid and nitric acid mixed. The object of the nitric acid is to prevent the formation of arseniureted hydrogen gas, which would otherwise be formed owing to the presence of some amount of arsenic in the precipitate treated. The arseniureted hydrogen gas is poisonous and very fatal.

Q. The object in doing that is to prevent the formation of that gas?

A. Yes, it is the most available and best oxidizing agent for that purpose. After all the impurities soluble in sulphuric and nitric acids are removed, the tank is filled with water to still further dilute the solutions and is allowed to settle for some hours, usually over night.

Q. I will ask you what the dilute solution of sulphuric acid and nitric acid mixed contains.

A. This solution would contain most of the zinc in the precipitate and sometimes any silver that might be in

(Deposition of V. B. Sherrod.)

the ore and a great many other impurities in very small amounts; also silica which has found its way into the product from the solution tanks, from the leaching tanks. I wish to correct that statement. It would not contain any silica in solution.

Q. You state it would contain the silver, zinc and other impurities?

A. Which would be soluble in sulphuric and nitric acid. After diluting and allowing the precipitate to settle, the supernatant liquid is drawn from this solution tank through a pipe connecting with this tank about one foot above the bottom, and it is allowed to pass through the filter presses for the purpose of collecting any precipitate that might be carried along with the solution in suspension. After this solution is all drawn off, the tank is again filled with water, and the same process repeated for the purpose of washing the precipitate free from soluble matter. This precipitate is then collected from the tank and from the filter presses and dried, pulverized and mixed with a definite proportion of fluxes and melted down in a crucible, about two hundred pounds being taken each time for each crucible. When this product has all been treated in that manner, the lead button or gold button obtained from the previous fusions are again melted down adding a little borax and moulded into bars for shipment.

Q. What can you state as to the average fineness of the gold thus produced at that mill by this process?

A. The bullion bars during the time that I have been

(Deposition of V. B. Sherrod.)

there would average as near as I can state from memory about eight hundred fifty fine.

Q. You may state whether or not that is marketable bullion at the mints of the United States Government.

A. It is marketable bullion, but I am not prepared to say whether any excess charges would be made for that fine bullion.

Q. It would be purchased by the government.

A. Yes, sir.

Q. Are you able to state what it costs per ounce of gold to refine that precipitate which you have described as obtained in the tank and from the filter presses?

A. I am not. I am not familiar with the cost sheets of the company.

Q. How do you determine the quantity of zinc dust that would be introduced into the precipitating tank commencing as you have described when the solution is first permitted to flow into that tank. How do you determine the quantity that is to go into tank?

A. By repeated experiments under the same conditions as far as possible as in the mill—that is, the same volume of solution and the same complex solution and a solution containing about the same values.

Q. You may state whether or not you do, as a matter of fact, determine substantially the quantity of zinc dust required in a given amount of solution carrying a given amount of gold before you introduce it.

A. We don't do so for every tank that is precipitated, knowing that the solutions which are pumped into that

(Deposition of V. B. Sherrod.)

tank will assay within very narrow limits. We assay this solution twice daily and know to a certainty that they will not vary outside of very narrow limits, and then having determined with any particular brand or carload of zinc how much of that dust will be required we apply that amount each time as long as results are good.

Q. Well, do you, as a matter of fact, by previous experiment or by actual use, determine approximately the amount of zinc dust that you must put into a given tank.

A. Yes, we do.

Q. You have stated that after having assayed that dust, a carload of zinc dust—do you assay or analyze it?

A. We analyze it.

Q. For what reason?

A. Because of a certain percentage of impurities in that dust having a very marked effect upon its precipitating quality.

Q. What does zinc dust contain?

A. Generally speaking, a good many impurities in the zinc according to the district from which it is produced.

Q. What does it contain?

A. Cadmium, lead, some amounts of iron and some silica and zinc oxide quite generally—

Q. Any metallic zinc as such?

A. Yes, sir.

Q. Then it contains zinc, oxide of zinc, some cadmium, some lead, some silica.

A. The rest of course is zinc, metallic zinc.

Q. Do you know from experience or from your general

(Deposition of V. B. Sherrod.)

learning or information in the line of your profession, how zinc dust is produced, of what it consists?

A. Generally speaking, I know something of the process. I am not familiar with it from any actual experience in its manufacture.

Q. You say that you analyze the zinc dust to determine what it contains? A. Yes, sir.

Q. What object have you ultimately in view when you do that, what must you know in order that you may determine therefrom what amount you must use to precipitate a given amount of gold in a given amount of solution?

A. We must know especially the lead and cadmium.

Q. Is it important that you should know the amount of metallic zinc in it?

A. Very important that we should know what we know technically as available zinc.

Q. Is that the reason why you assay it, to determine the amount of available zinc?

A. And to determine the lead and other impurities which might tend to offset the efficiency of this available zinc.

Q. Am I to understand if you have a hundred pounds of zinc dust, for an illustration, you wish to know how much of that hundred pounds is comprised of lead, of cadmium and other impurities in order that you may know the amount of metallic zinc? A. Yes, sir.

Q. Why is it important for you to know the amount of metallic zinc in the dust used?

(Deposition of V. B. Sherrod.)

A. Zinc oxide, one of the impurities, has no precipitating value, that I know of, and lead seems to be a positive detriment and the amount of metallic zinc not only aids us in determining the value of the purchase, determine the percentage of efficiency we can get out of it, but serves as a check on the analysis in determining the other elements.

Q. You say, as far as you know, the oxide of zinc has no precipitating value?

A. That is to say the oxide of zinc alone would have no precipitating value. Whether there is a complex action or hidden reaction which aids or prevents in the precipitation, I am not prepared to say.

Q. You want to be understood then, if I understand you, to say that the use of zinc oxide alone by itself as a pure agent, you don't know that it has any value?

A. I know that it has not.

Q. But you don't want to be understood that in connection with zinc dust it has no value? A. No, sir.

Q. Do you know by experiment made by yourself or otherwise whether or not an electrolytic condition is set up by the introduction of zinc dust into the vat of cyanide of potassium containing gold?

A. That depends on the definition used in defining chemical electro action. If by this is meant the simple replacing of one element which is electro-negative by another element in that compound which is electro-positive, it is an electro chemical action and some chemists assume that it is a merely displacement reaction.

(Deposition of V. B. Sherrod.)

Q. As to whether the two substances, the oxide of zinc and the metallic zinc, thus in juxtaposition in this cyanide of potassium carrying gold would constitute a voltaic power thus setting up an electrolytic action, you are not disposed to say?

A. I don't know.

Q. State whether or not your experience teaches you that the greater the quantity of lead or cadmium or other, what I may call foreign substances, contained in the zinc dust, the greater the quantity the greater the amount of zinc dust you need in the precipitation of gold.

A. We have had quite conclusive evidence of that fact at the mill during the time I have been there.

Q. Grounded upon your experience, you would say the greater the impurities the greater the weight of dust you must put into that solution? A. Yes, sir.

Q. Grounded upon your experience, is it necessary to use a definite amount of zinc dust in a given solution carrying gold, a solution of cyanide of potassium carrying gold, for the purpose of accomplishing the complete or approximately complete precipitation of gold?

A. It is.

Q. Why do you say that and how do you know that?

A. First it is necessary to have enough zinc dust to precipitate all the gold in the solution and by enough I mean a practical excess, not an excess as we might understand the term by figuring out from chemical reaction how much zinc would be required to combine with the gold, but the excess we determine by actual experiment

(Deposition of V. B. Sherrod.)

—that is, the minimum amount of zinc that will cause proper precipitation. If too much zinc is employed, in the first place it tends to foul the solutions too rapidly, especially the complex form of solutions that are used at the Golden Gate Mill. In the second place, not all the available zinc is consumed and the portion that is unconsumed goes to the refinery along with the precipitate of gold and the slight excess of zinc that is necessary and increases the cost of refining by requiring more acid for its solution, and more labor for treating such a large volume, and also the product, after parting with the acids, contains a larger percentage of zinc and the cost of fluxing in the crucible, refining, would be greater and the volume of the slag produced would be increased and the baseness of the bullion would be increased.

Q. You speak of a definite amount of zinc there being used, and by that you don't mean to say a definite amount as determined by chemical action or atomic weight—that is, the exact amount that would be required to throw down a given amount of gold in a given amount of solution but that which would practically throw it down and put it into commercial shape?

A. Yes, sir.

Q. Suppose you took just exactly the amount which you would figure up by the rule of the books as expressed by the chemical equation—that is, its exponent in a chemical equation; what would be the result?

A. I have never experimented along this line, but from my general knowledge of chemical reactions, I

(Deposition of V. B. Sherrod.)

should say that what gold was precipitated would be very apt to be redissolved by the excess of cyanide in the working solution.

Q. Then, if that solution went back to the ore tanks or the pulp tanks—

A. The values contained in the solutions might be precipitated by the base elements in the ores perhaps, but if not, some of it would be lost, due to the imperfect washing of the ore after treatment.

Q. So that to use the exact amount of metallic zinc in the dust or otherwise to throw down a given amount of gold, you would not accomplish the purpose, the theoretical amount, I mean, as expressed in the equation.

A. The theoretical amount as expressed in the equation usually employed to express that reaction? It would not.

Q. Therefore it takes a little beyond that amount which the theory of the books requires?

A. Yes, sir.

Q. Do you know anything about the use of what is called zinc shavings in the mills of the country for the purpose of precipitating gold from cyanide solutions.

A. Only from the use of it in laboratory purpose and from following the literature.

Q. Have you seen any of these mills? A. I have.

Q. But you don't speak to the card or by the card?

A. I have had no connection with mills using the process.

Q. But you have seen them?

(Deposition of V. B. Sherrod.)

A. Yes, sir, in operation.

Q. Are you able to state from your experiments in the laboratory and from literature and from your observations of mills practically in use, as to whether they use a greater amount of metallic zinc in weight than is used by the zinc dust process.

A. No, for my laboratory experience has been with another end in view.

Q. How much time is consumed in the tank containing, as you have stated under your management, twenty-eight tons of solution, how much time is consumed from the moment you introduce the solution into the precipitating tank, until the precipitation is complete?

A. About sixteen minutes. The precipitation is complete as soon as the tank is filled and the air shut off.

Q. As I understand you the dust is introduced continuously with the air.

A. Every few minutes, the attendant shakes a little into the tank. First, a sufficient amount is weighed and that is all shaken into the tank in a few minutes.

Q. So the solution is pouring into the tank, the dust is being shaken into it at short intervals and the air is being moved about at a pressure of twenty pounds to the square inch, and at the expiration of sixteen minutes the operation is complete and you let the solution run off. What is the value of the agitation by the method you employ, or any method for that matter, in the use of zinc dust?

A. To bring as far as possible every part of the sur-

(Deposition of V. B. Sherrod.)

face of the zinc into intimate contact with every part of the solution.

Q. Do you know, from observation or experiment made by yourself, whether the result of the precipitation or replacement of a particle of gold in the solution, of gold in the solution coming into contact with a particle of zinc, is instantaneous or does it require a perceptible length of time to accomplish that end?

A. I don't know from experiment.

Q. State whether or not your habit is to assay the tailings from these tanks, and if you do, state why you do it.

A. By tailing solution is meant the solution that passes through the filter presses and after the precipitate of gold has been removed, I believe. We assay that twice a day, or sample it as an average of the preceding twelve hours taken at regular intervals for the purpose of determining if the gold has all been precipitated and if so, if it has been retained by the filter presses.

Q. Have the one as a check upon the other for the purpose of ascertaining whether the gold has all been precipitated and whether or not the requisite amount is in the filter presses? A. Yes, sir.

Q. Twice a day you do that? A. Yes, sir.

Q. What is the result, according to your experience down there, as to the gold contained in the tailings solution?

A. For a very great portion of the time the tailings solution will contain traces of gold—by traces, I mean less than four cents to the ton of solution. At times the

(Deposition of V. B. Sherrod.)

tailings will exceed this sometimes assaying as high as twenty to thirty cents to the ton. If more than four to eight cents are found in the solution by assay an inquiry is started as to the cause.

Q. As to the cause? A. Of the high values.

Q. Does it reflect in any way upon the question as to whether you have used too much or too little zinc dust?

A. It does if the filter presses themselves are retaining all the precipitate, but if from any cause some of the precipitate, the very fine particles of gold pass through the filters, we must determine if that is so.

Q. When you assay that you look to the cause—if you find as high as twenty to forty cents to the tons of solution, you look for the cause? A. Yes, sir.

Q. If you find that the filters have taken up all the gold as per the assays they should have taken up, then what?

A. If we find that the presses have allowed none of the precipitate of gold to pass them, we are usually quite persuaded that all the gold has not been precipitated from the solution—there are some exceptions to that but that is usual—and this might be due to too little potassium cyanide in the solution but usually to too small an amount of zinc.

Q. Are you able to determine to which of these two they are attributable by assaying the solution of potassium cyanide or by assaying for the quantity of zinc, or what? What is the value of these assays?

A. We are from an investigation in an experimental

(Deposition of V. B. Sherrod.)

way—that is, we try varying the amount of the zinc or varying the amount of the potassium cyanide.

Q. Sometimes the introduction of a little more cyanide accomplishes the end and sometimes more zinc dust accomplishes it?

A. Yes, sir, but if it requires more cyanide, it is usually due to the carelessness of the man who looks after the strength of that solution, for we find that we don't have to vary the strength of the solution in that mill in order to get perfect results.

Q. So your trouble is not usually with the cyanide solution? A. No, sir, usually with the zinc.

Q. Supposing it assays forty cents, what have you found would be the results if you add more zinc dust, where it is not attributable to the solution but where it is not found in the filters?

A. We have never, as far as I remember, failed to bring a complete precipitation by the addition of more zinc dust.

Q. The methods you have of determining the quantity you require, the assay of the solution twice a day after it has passed through and the determination before from experience and from former assays? A. Yes, sir.

Q. You spoke, Mr. Sherrod, of the excess of zinc dust or zinc, metallic zinc, through which the solution would pass, or which you put into the solution, either way, that it would foul the solution, in a former part of your testimony, that it would deteriorate or vitiate the solution in its solvent capacity, in its capacity to take up the gold.

(Deposition of V. B. Sherrod.)

Is that the effect in your own experience of letting the zinc stand a long time that it would vitiate it?

A. It is the experience in such a complex form of solution as ours.

Q. What would be the effect then of the introduction of an approximately definite amount, such as would take up the contained gold, as to fouling the solution? What effect would it have?

A. The addition of a definite amount, and by definite I mean the minimum amount that would accomplish the results, does not foul the solution, owing to the fact that but very little zinc enters the solution, and that the solutions clear themselves to some extent by being constantly diluted by the amount of water which is applied to the leaching tanks at the end of the process as a wash.

Q. If you persistently use a solution of cyanide of potassium in a large quantity of zinc, would it, in your judgment, become so impregnated or foul that it would not take up the gold as well?

A. It would in my judgment.

Q. Beyond the amount required for the precipitation of the gold? A. Yes, sir.

Q. What would you do in a case of that kind in practical milling?

A. In practical milling, it is customary to throw away the solutions when they become foul.

Q. Do you know that from your own knowledge?

A. From my knowledge of text-books alone.

(Deposition of V. B. Sherrod.)

Q. Do you know of the mills in the district throwing away their solution?

A. I do not, for I am not familiar with the other mills in the district.

Q. Has the mill with which you are employed ever been required to throw away a solution?

A. It never has during the time that I have been employed by that company.

Cross-Examination.

(By Mr. JOHN H. MILLER.)

Q. Where is this mill situated you have referred to as the Golden Gate?

A. It is situated in the town or city of Mercur, I am not prepared to say which, and in the county of Tooele, I believe it is called. I am not very familiar.

Q. Is that the property of Captain De Lamar, the complainant in this case?

A. It is the property of what is known as De Lamar's Mining Company. I don't know the inner relations of the company.

Q. It was started by Captain De Lamar?

A. I so understand.

Q. He is the principal party interested in it?

A. So far as I know. I am not acquainted with the inside affairs of the company.

Q. Where do you get this zinc dust from that you operate with?

A. I understand that the zinc dust that is being used

(Deposition of V. B. Sherrod.)

now is imported into this country, that is the zinc dust that is being used at the present time.

Q. You don't know where it comes from?

A. I do not.

Q. Do you get it in carload lots? A. We do.

Q. How and where is it kept before it is put to actual use?

A. The company has a regular storehouse for the purpose of keeping supplies of that kind and it is kept there; also a good deal of it is kept on hand in the room where it is used, known as the solution room.

Q. How large an amount is kept on hand?

A. Comparatively a large amount.

Q. In what form is it kept?

A. You mean what sort of packages?

Q. Yes.

A. All I have seen around the solution room, which is the only zinc that I have anything to do with, the only zinc that I see, is kept sometimes in boxes, barrels or casks, but how it came in the original packages, I am not prepared to say.

Q. You keep a supply in the room where it is to be used, I understand.

A. Yes, but I don't know how many hours or days of consumption that might be.

Q. You resort to that supply as you need it from time to time? A. Yes, sir.

Q. And that is kept around the room in barrels or boxes?

(Deposition of V. B. Sherrod.)

A. There is usually a barrel or box as a temporary deposit for it kept there.

Q. Is that a large box?

A. No, the box is usually smaller than a barrel. I have seen various receptacles for it.

Q. And when you want to use it, you go to this box and dip out as much as you desire and use it?

A. The man in charge does, the attendant in that room.

Q. Have you ever analyzed this stuff?

A. I have.

Q. Now, what is it composed of, if you have your analysis with you?

A. I have some analyses with me, one that I made myself and I can refer to my notes. How definite information do you want?

Q. Did you make a quantitative or qualitative analysis? A. I made a quantitative.

Q. Just give it.

A. The first determination was a determination of the amount of metallics which would not pass an eighty mesh sieve—that is, a sieve containing eighty meshes to the linear inch, and understand that this is a sample of zinc which is handed to me, and it is not the zinc that we are using.

Q. Well, who handed you this zinc?

A. It came through the office of the company.

Q. Who gave it to you?

(Deposition of V. B. Sherrod.)

A. It was handed to me by the superintendent of the mine, Mr. MacVichie for the purpose of determining if it was satisfactory to purchase.

Q. Did you determine whether it was satisfactory or not?

A. The analysis is not quite complete, but will practically determine whether it is satisfactory.

Q. Is it satisfactory?

A. Yes, sir, so far as the analysis is yet completed.

Q. You have not completed it?

A. It is very nearly complete, complete enough for practical purposes.

Q. As far as you have gone?

A. The amount of metallics that would remain on an eighty mesh sieve is none or a trace, and the amount of metallic lead is twenty-two one-hundredths of one per cent, and the amount of sesqui oxide of iron and alumina combined is fifteen one-hundredths of one per cent. The amount of total metallic zinc is ninety-five and two one-hundredths per cent, and the amount of silica or insoluble residue is nineteen one-hundredths of one per cent, and the amount of oxygen in combination with the zinc is one and three-tenths of one per cent.

Q. By this last element, you mean zinc oxide?

A. I mean oxygen that is in combination with the zinc as zinc oxide.

Q. Have you made any examination to determine how that zinc oxide is united with the metallic zinc?

(Deposition of V. B. Sherrod.)

A. Well, the zinc oxide is simply a coating of oxygen on the outside of the zinc, the same as iron rust would be a coating of rust on the outside of the pure iron.

Q. This is caused by the oxygen fom the surrounding atmosphere uniting with the zinc on the surface.

A. I understand it is caused by the oxygen that finds its way into the distillation furnace used in zinc dust manufacture and uniting with the zinc fumes.

Q. Now, is this the only analysis you have ever made of zinc dust?

A. It is the only analysis of zinc dust for that purpose.

Q. Have you ever made an analysis of it for any other purpose?

A. No, I have made analyses of different sorts of commercial zinc, but not as dust.

Q. Do you know where this sample of zinc dust came from you speak of as having been analyzed by you?

A. I know what the label was.

Q. What was that label?

A. Klipstein & Company, of New York.

Q. I presume it was a sample sent by that firm for you to analyze with a view to having you buy some of that for use in your mine.

A. I understand that is the case.

Q. And you analyzed it for that purpose?

A. Yes, sir.

Q. And you determined from your analysis it would be a commercial article for that purpose?

(Deposition of V. B. Sherrod.)

A. Yes, sir.

Q. And would be satisfactory for your purpose?

A. Yes, sir.

Q. Where does the zinc dust come from that is actually used?

A. I don't know any further than that I am informed by the employees of the mill that it is being imported.

Q. Does any of it come from Waldstein's house?

A. I could not state.

Q. Now, when you proceed to use zinc dust in throwing down these metals in cyanide solutions, how do you determine the amount of dust that you are going to use for any one solution? I understand that you have to determine that beforehand? A. Yes, sir.

Q. How do you determine that?

A. Well, I assay the value of the solution before it is pumped into the precipitating tank, and we know by repeated experiments that the percentage of the other impurities in this solution is about the same always—it does not vary—and having once determined the amount of zinc dust of a certain brand that is required to produce complete precipitation with a minimum consumption of zinc dust, we apply that same amount until the assay of the tailings solution indicates that a change of some kind is needed.

Q. Then with every different manufacture of zinc dust, you would have to go through with the same series of experiments?

(Deposition of V. B. Sherrod.)

A. We have to have it assayed, for the dust itself varies.

Q. Well, doesn't the dust vary considerably?

A. I have not proved that it is—or that it does.

Q. Well, zinc dust of different manufactures would?

A. Yes, all different manufactures would vary.

Q. So if you conclude to use that zinc dust which you analyzed and with it to displace this you have been using, you would have to experiment to find out how much you would require?

A. In order to find out the minimum amount.

Q. How long would it take?

A. We would determine that in a practical way in the mill itself; with one tank of the solution, we would use the amount of zinc usually employed, especially if the analyses of the zinc correspond very closely with that previously used, and if that produced good results and we were using quite a fairly large amount we would reduce that a very little at a time until the tailings indicate that we have gone too far with the process.

Q. I understand you would start in a tank of the solution and you would put in as much of the zinc dust as your judgment would indicate would be proper, and see what the result would be? A. Yes, sir.

Q. And if the result wasn't satisfactory you would know you hadn't used a sufficient amount of the dust?

A. By the word "judgment" I mean my judgment as determined by prior experiments with the same kind of

(Deposition of V. B. Sherrod.)

solution, with the same gold and dust of the same composition.

Q. I understand that, and if at the first trial you found from the result that you hadn't used enough of the zinc dust, then at the next trial you would put in a little more, and you would keep on until the results showed that you had used the requisite amount?

A. Yes, sir.

Q. And that would be the standard you would go by from that time on?

A. It would be if the precipitating tanks had been in use for some little time without a cleanup, but if the tanks were clean when we started, we would know by experience we can gradually reduce the amounts used for several days and still get good results.

Q. So the condition of the tanks as to cleanness or foulness would be an important factor?

A. By cleanness or foulness I mean whether or not the accumulated gold precipitate of several days is in the tank.

Q. Then you would use a greater amount when the tanks were clean than when they were not fresh?

A. Yes, sir.

Q. How often do you make a cleanup?

A. Once a month since I had been there.

Q. So there is a period of about thirty days during which you would use the same tank and you would have to vary the amount?

A. During the first half of these thirty days we could gradually reduce the amount of dust employed.

(Deposition of V. B. Sherrod.)

Q. So the amount of dust that you would be using at the end of thirty days after a cleanup comes would be different then when you first commenced?

A. Yes, sir.

Q. How much would that vary?

A. Sometimes it is necessary with the first solution used in a clean tank to employ as much as twenty pounds of zinc dust. This is gradually reduced to, say five pounds the last half or two-thirds of the month.

Q. With a fresh tank after a cleanup you would go back to the original amount? A. Yes, sir.

Q. And repeat the operation as with a first one?

A. Yes, sir.

Q. Now, suppose you were called on to run a cyanide plant and when you first started in you wanted to use this zinc dust never having determined or not knowing the exact character of the ores or the strength of the solution, how would you proceed to get yourself into harness so as to run the thing along evenly and smoothly thereafter?

A. My experience has taught me that the actual mill test would have to be made in a precipitating tank with the zinc to be employed; for the amount required in practical work, it has been my observation, is much smaller than that employed in actual test in a beaker or other small tests.

Q. In other words, you have to experiment first and find out how much zinc dust would have to be used, would you?

(Deposition of V. B. Sherrod.)

A. Yes, sir, then draw our conclusions from it, and the assay of the solution it was intended to precipitate.

Q. And after you had found out what amount to start with, that amount would have to be varied from time to time. A. Probably, quite probably.

Q. Now, you spoke of agitating the solution quite thoroughly. I understood you to say it was agitated by an air blast? A. Yes, sir.

Q. What is the apparatus that you use for that purpose?

A. They have compressed air pipes in that room which are used to supply the mine with compressed air, power, and they have connected a rubber hose with one of these pipes and put about a sixteen foot in length piece of five-eighths inch pipe, so that the attendant can readily turn it in the tank.

Q. So that the attendant stands there holding the nozzle which he directs into the tanks.

A. The attendant is a man regularly employed for solution and precipitating purposes.

Q. No automatic machinery for agitating the solution. A. It could be employed very easily.

Q. But not in actual practice at the mine?

A. No, sir, it is not.

Q. You don't use any paddles or stirrers or anything of that kind? A. No, sir.

Q. I notice in the Waldstein patent, this statement. Speaking of the solution, he says: "In its finely divided state, the zinc dust will settle to the bottom of the

(Deposition of V. B. Sherrod.)

precipitating tank for want of resistance. Therefore, I have provided for the precipitating tank a revolving shaft to which are attached one or more paddles or agitators, which being set in motion disperse the zinc dust through the whole mass of the contained solution, the agitation being continuous until all the minerals in the solution have been precipitated." I understand from you that at this mine where you are, they don't use any such apparatus as that.

A. It is my understanding of the case that it was local conditions that caused them to use air. They had the air and it would require quite a little machinery to equip with these revolving paddles.

Q. And in order to obviate the necessity of providing this expensive machinery, paddles, etc., they used the air process you have just spoken of.

A. I understand that is the reason.

Q. Suppose you were to use a little more zinc dust than was necessary to precipitate all the metals in the solution, what would happen.

A. With the mill solution of the composition of the one we employ up there it would dissolve considerably more zinc than would be necessary for the mere precipitation of the gold, which would tend to foul the solutions and furthermore, some of this excess, some of this unnecessary excess of zinc would not be dissolved, and it would pass with the precipitated gold into the refinery, and increase the cost of refining by increasing the amount of acid required to dissolve the precipitate,

(Deposition of V. B. Sherrod.)

and by increasing the labor required to handle and treat the increased weight of product, and by increasing the expenses of the labor necessary to handle so large a product, and by increasing the cost of the fluxes required and decreasing the fineness of the bullion produced.

Q. Suppose you don't use enough zinc-dust to precipitate all the metals in the solution, what would be the result?

A. If we don't use enough zinc dust to precipitate all the metals in the solution, the tailings from the presses, from the filter presses, would show a varying amount of gold in solution, and if that was not corrected, it would lead to further complications in the leaching, perhaps a slight or a considerable increase in the assay of the tailings, of the waste portion.

Q. Then some gold instead of being precipitated would be redissolved?

A. It would not be precipitated at all as I understand it, but if precipitated, it would probably be redissolved. I am not prepared to state definitely.

Q. Now, as I understand you to say, if you use the exact amount required then everything would go on as required and you would get all the gold.

A. By exact, I mean reasonable and definite.

Q. What is your idea as to the reasonableness of the excess? I want to get your idea merely.

A. For instance, if we have determined by experiment that four pounds of zinc with a given solution

(Deposition of V. B. Sherrod.)

would accomplish good results, but that three and a half pounds would fail properly to produce these results, we would not feel safe to use four pounds, for the half pound would be too close. Perhaps five pounds would answer.

Q. You consider it prudent to put in an extra pound, making five pounds in all. A. I would personally.

Q. What is the effect of that extra pound that you put in there? What does it accomplish?

A. That excess of zinc is of course part of it collected in the filter presses. Most of it settles to the bottom of the tank along with the rest of the precipitate of gold, and the next solution that is pumped into that tank for precipitation purposes is agitated with the air, and this same zinc dust would assist that that was put in next time in the precipitation.

Q. When this gold is precipitated, I understand it is not pure, but it is base bullion? A. Yes, sir.

Q. Can you give us some idea as to the extent of its baseness or richness?

A. This depends to quite an extent upon the quality of the zinc and the base qualities unite in a very disproportionate manner, comparatively speaking, with the amount of impurities; for instance, a small amount of some impurities seems to produce an exceptionally base bullion and so the variation has been within very wide limits, owing to this excess, but within very narrow limits when using the same brand of dust.

(Deposition of V. B. Sherrod.)

Q. How do you refine that bullion after you have taken it out of the precipitating tank?

A. The bullion is collected from the bottom of the tank and from the presses which have caught the rest of it, taken to the refining department and first dried in a muffled drying furnace. After drying it is put on a cement floor and with an iron roll, weighing perhaps two hundred pounds, it is pressed down moderately fine, and after sampling it is put into a dissolving tank. This is a large wooden vat with an inner tank of lead. Between the outside of it and the inner tank is water. I think this tank has been developed, as it were. I don't know it was the original intention to have it that way, but that is the way it is now. To this dried and ground precipitate which is put into the tanks some water is added and then sulphuric and nitric acids mixed. The object of the water being added first is to prevent the destruction of the lead lining by the strong nitric acid which would be first used and to provide the proper dilution of the acids for rapid solution. After all the elements or impurities which are soluble in this acid mixture have been dissolved, it is further diluted with water—in fact, the tank is filled with water and allowed to settle. This is to so dilute the acids employed and which are still remaining unattacked that it will have no injurious effect upon the pipes and filter presses employed in the subsequent operations. This solution after standing all night or for some hours to allow the gold to settle is drawn from the tanks by decantation—

(Deposition of V. B. Sherrod.)

that is, a pipe connected with a tank about a foot or a foot and a half from the bottom of the tank. After this solution has all been drawn off, the valve is closed and the tank again filled with water to still further dissolve the gold. This operation is continued to still further wash out the soluble elements, to still further complete the operation. All these solutions and wash waters are allowed to run through the filter presses to collect any gold precipitate which might not have been settled to the bottom of the tank. After this operation is completed the gold precipitate is collected from the lead tank and from the filter presses and again dried in a muffled furnace. It is then ground and mixed with a definite proportion of flux put into a large graphite crucible and subjected to a hot wind or blast furnace until molten. It is then poured into molds and the gold obtained is separated from the slag and reserved for further melting. The crucible employed in this process holds about two hundred pounds of the product and flux, of the precipitated gold. After the product has all been treated in this way, all the gold buttons are melted down and a little borax used to clean them up and poured into bullion bars.

Q. Now, what is the grade of value in these bullion bars, after it has gone through this process.

A. The average value, I should assume, would probably be about eight hundred fifty fine—that is, about eight hundred fifty parts of gold to a thousand parts.

(Deposition of V. B. Sherrod.)

Q. Now, what is the value of the product before it goes through this process, of the gold precipitate before it goes through this refining process?

A. It is now averaging about thirty-five dollars per pound. It has been very much higher and somewhat lower. The lowest since I have been there was due to very well known causes and was about seventeen dollars per pound.

Q. It runs now about thirty-five dollars per pound?

A. Yes, sir.

Q. And what would be the value per pound in the shape of bullion after you have refined it?

A. Shall I figure that out?

Q. Yes, sir.

A. That would be about seventeen dollars and fifty-six cents per ounce.

Q. Just figure it down to pounds so as to have it in connection with the other.

A. I believe I am right. On the basis of sixteen ounces to the pound that would be two hundred and eighty dollars and ninety-six cents and at Troy weight two hundred fifty-six dollars and two cents per pound bullion at eight hundred fifty fineness.

Redirect Examination.

(By Mr. A. C. ELLIS.)

Q. You have three tanks at that particular mill, precipitating tanks running all the time. First take up one and then the other.

(Deposition of V. B. Sherrod.)

A. Yes, sir, we have three.

Q. If, therefore, a mistake were made in the amount of zinc dust used in the solution, you would discover it quickly.

A. Well, in practice it would be some hours in fact after the solution had all been filtered, for the assays are made only once in twelve hours, and each of the tanks might be used twice in that time.

Q. The solution that passes into these three tanks all comes from one solution tank?

A. Yes, it is known as the pregnant solution tank, from which comes the solution to all the leaching tanks in the mill.

Q. And from which, of course, it passes to the precipitation tanks. A. Either way is good.

Q. You say it might be a run of twelve hours before you would make that discovery that there was something wrong.

A. It might be if that should occur during the early part of the period during which the sample is obtained. Samples are being taken at regular intervals, every few hours during that twelve hours, each sample being put into the sampler and at the end of that period, an average sample is taken to the laboratory for analysis.

Q. Then you would discover it in twelve hours?

A. Yes, sir.

Q. Supposing you discovered that the tailings solution assayed fifty cents to the ton of solution, you would investigate at once? A. Yes, sir.

(Deposition of V. B. Sherrod.)

Q. Investigate at once and act accordingly?

A. Yes, sir.

Q. Then when you say that for the period of thirty days the amount of zinc dust that you use would vary, and that it would grow less and less to the expiration of the month, would that be so, or would that statement have any bearing at all upon the proposition which I have just made to you about the discovery in any given twelve hours that your tailings solution assayed, I will say, fifty cents or a dollar.

A. It might or might not have a bearing upon these conditions, for if the process of reducing the amount of zinc dust used each time was carried along too rapidly—that is, if the reduction were too great each time, the minimum amount might have been passed, thus causing these tailings, or it might possibly be due to other causes.

Q. Now, you speak of that attendant standing there and swinging that hose or pipe, moving it about on the bottom of the precipitating tank, so as to thoroughly agitate the solution. He stands there how long during the process?

A. He stands right by the tank from the time the solution begins to be pumped into the tanks until the pumps are stopped and the tanks are filled and the dust has all been used and the process is complete.

Q. You speak of the attendant standing near the tank and swinging the hose or pipe during the process of using the zinc dust. What length of time does he stand there and use that hose on a given tank?

(Deposition of V. B. Sherrod.)

A. He stands there about sixteen minutes.

Q. And state whether or not he is the attendant who stays in and is required to be in the precipitating room?

A. He is the attendant who attends to the precipitating room and does the work connected with it.

Q. You say that your product is now assaying about thirty-five dollars to the pound? A. Yes, sir.

Q. It has run higher?

A. It has run very much higher.

Q. How much higher?

A. From the records I find in the laboratory, I know of one or two cases where it has exceeded sixty dollars per pound somewhat. I could not state definitely.

Q. You stated that was due to well known causes?

A. Yes, sir.

Q. What causes?

A. Oh, we ordered—just before this product began to assay so low, a new car of zinc was purchased and the dust didn't give satisfactory results, and this happened before I went there, but when I went there to the employ of the company, they were still using the dust, so I speak to some extent from experience.

Q. State whether or not the amount of foreign substances contained in the zinc dust such as you have named, lead, cadmium, and the like, would tend to debase the value of the product. A. It did affect it.

Q. Is that the cause to which you attribute its running low? A. Altogether.

Q. On that, now, let me ask you, the higher the me-

(Deposition of V. B. Sherrod.)

tallic zinc contained in the zinc dust, the higher the product.

A. The higher the percentage of metallic zinc, or as we term it available zinc, contained in the zinc dust used, the less zinc dust is required to give us perfect precipitation, and consequently the higher the assay of the precipitated gold.

Q. Do you know of your own knowledge or experience whether based upon the efficiency of the zinc as to precipitating gold from the cyanide solution—do you know why the product produced from the use of filiform zinc should be of any higher grade or lower grade than the product produced from zinc dust?

A. There is in my opinion a greater tendency for the precipitated product to contain large particles of undissolved zinc, as the filiform zinc or zinc shavings are very much thicker than a particle of zinc dust, and not all of this zinc would be exposed to the action of the solution, but perhaps to the formation of a coating of precipitated gold or other impurities which might form on the outside of this coarse particle of zinc. The gold would be an impurity to the zinc.

Q. Mr. Sherrod, please state what method you employ in obtaining the silver which you testified you had put into the solution by the dilutes of sulphuric and nitric acids.

A. The amount of the silver in the ore is so small that if it were saved and put into the bullion with the gold, the amount compared with the gold would be so little—

(Deposition of V. B. Sherrod.)

the Government does not pay, as I understand, for so small an amount of silver. At any rate, no attempt is made to save it. The entire amount of silver in the solution would not be over sixty dollars for the entire month.

Q. What percentage would that be of the entire values produced, approximately, of these ores?

A. Five hundredths of one per cent.

Q. Is there any metallurgical difficulty in getting that silver from such a solution?

A. Not insurmountable difficulties but the silver in the solutions of sulphuric and nitric acids is in the presence of a large excess of zinc, which has been dissolved in these acids and soluble lime salt and other impurities and the recovery would not pay.

Q. You mean the recovery of that particular amount?

A. No, sir, the kind, of that particular kind of silver.

Q. But there would be no serious metallurgical difficulty in saving that and making a base bullion?

A. As a matter of fact, in the United States mints the silver is parted in some cases in nitric acid and afterwards recovered.

Q. You say, if I understand you, that you pursued metallurgical literature in your profession since you left college? A. Yes, sir.

Q. And have observed mills in this section of the country? A. Yes, sir.

Q. Have you seen or have you any knowledge of zinc dust being used in any country as a precipitate for gold from a cyanide solution on a commercial scale?

(Deposition of V. B. Sherrod.)

A. I know nothing about it except what knowledge I had gained from very recent current literature, until I came to De Lamar's mine.

Q. About the first of September, 1894. Have you any knowledge or have you ever seen an account of any mill using—that has used zinc dust as a precipitate for gold from a cyanide solution? A. I never have.

Q. Have you ever seen any reports which gave any account, any papers written for scientific magazines or elsewhere in the course of literature you have pursued of the use of zinc dust as a precipitate?

A. I have a book by one of the standard text-book authorities on cyanide in the United States, the last edition of which has been printed within two or three years, saying zinc dust or zinc fumes have been tried without success.

Q. What author was that?

A. Mr. Bosqui. He is the author of Bosqui's work on Practical Cyanide Process. I understand that his experience has been principally at the Bodie mine near San Francisco.

Mr. MILLER.—We move to strike out the answer of the witness on the ground that it is hearsay.

Witness excused.

Errata: Answer to question on page six, "How long do you let it rust in practice?" misstates the fact, and should read "from 25 to 60 minutes," instead of "from four to six hours."

V. B. SHERROD.

Mr. GEORGE MOORE, witness produced, sworn, and examined on behalf of the complainant, testified as follows:

Direct Examination.

(By Mr. A. G. SAFFORD.)

Q. What is your age, residence, and occupation?

A. Thirty years approximately; Salt Lake City.

Q. And your business?

A. Agent for the Consolidated Kansas City Smelting and Refining Company.

Q. In the course of your business, do you purchase for your principals so-called cyanide products?

A. Yes.

Q. And as to the price that you pay for these products how is it fixed or determined?

A. It is per ounce of gold contained in the product, so much per ounce.

Q. And what do you pay, what are your present prices for an ounce of gold contained in the product?

A. Paying nineteen seventy-five.

Q. And an ounce of fine gold, I believe, at the mint is worth how much? A. Twenty sixty-seven.

Q. And your profit is represented by the difference in these two sums?

A. Our gross profit of course is represented by the difference.

Q. Can you tell us what the average has been of the values which you have paid for these cyanide products per ton during the past few months?

A. I have some months taken at random. I took them yesterday afternoon, the product for the whole

(Deposition of George Moore.)

month, the months taken at random. April, 1899, the average value was $16.25, the average value at $20.67, that is the assay value. June of the same year it is $22.60. September of the same year is $16.14. December $18.21. April of this year, this last month, $18.01. There are five months taken at random.

Q. These products have been purchased from different producers, I suppose.

A. Yes, they embrace silver and gold cyanides.

Q. Of different producers?

A. Everything included. The entire shipments for these months.

Q. Do you know whether these products that you have purchased were obtained by precipitation with zinc shavings or other kinds of precipitates.

A. They were precipitated with zinc shavings, except the De Lamar shipments, which were included in April and June of 1899. Those are zinc dust precipitation.

Q. You haven't purchased any from De Lamar since?

A. Since the first of July, the 7th or 8th of July of last year.

Q. 1899? A. Yes.

Q. Who pays the transportation charges on this product? A. The shipper, mine owner.

(By Mr. A. C. ELLIS.)

Q. You might state, if you know, what the express charges are on that product.

A. I can give you the charges from Salt Lake and from Fairfield, or Salt Lake and common points, the

(Deposition of George Moore.)

same thing. From Salt Lake and common points, it is six dollars per hundred pounds and one dollar and a half per thousand dollars valuation.

Q. One dollar and a half per thousand dollars valuation and six dollars per hundred?

A. Per hundred pounds.

Q. Is there any other person or corporation engaged in the business of purchasing cyanides in this intermountain country, save your house?

A. I think not.

Q. Are the cyanides produced from zinc shavings or filiform zinc all marketed in that way in this intermountain country, so far as you know?

A. I don't know. I don't think all are, if you call Montana intermountain country. There are some shippers in Montana that produce their own bullion and probably use the zinc shavings but they are not many.

Q. You don't know the name?

A. I don't know the names, but they are not many.

Q. The great bulk of the cyanides produced in the intermountain country is marketed through the purchasers, by your own company?

A. The only one I know is the April Fool, at De Lamar, Nevada, and they have recently gone to refining.

Q. Have they heretofore marketed their products through your house? A. They have.

No cross-examination. Witness excused.

Correction: The only producers using zinc shavings not marketing their product with our company that I

(Deposition of Duncan McVichie.)

know of is the April Fool Company at De Lamar, Nevada; they have recently gone to refining.

GEORGE MOORE.

Mr. DUNCAN MACVICHIE, being first duly sworn, testified as follows:

Direct Examination.

(By Mr. A. C. ELLIS.)

Q. Mr. MacVichie, please state your name and age and principal place of residence and your business.

A. My age is forty; my place of business is Mercur, Utah, and my residence is Salt Lake City.

Q. In what business are you engaged?

A. I am the general superintendent of De Lamar's Mercur Mines.

Q. How long have you been superintendent of that property?

A. I was appointed superintendent of the mine in August, 1897, and general superintendent of the mine and mill in November, 1898.

Q. Have you had charge of the mill as its general superintendent ever since that date? A. Yes, sir.

Q. And have you now? A. Yes, sir.

Q. And the mine too? A. Yes, sir.

Q. Have you given it your attention in its various details, the details of its business?

A. Not in detail.

Q. It is under your general supervision?

A. Yes, sir.

(Deposition of Duncan McVichie.)

Q. Have you familiarized yourself with the process there employed for the reduction of the ores of that mine?

A. Yes, sir, practically.

Q. Did you hear the testimony of Mr. Sherrod delivered in this presence and date touching the process of that mill? A. Yes, sir.

Q. As to that, state whether or not he has substantially stated it correctly as it is.

A. Yes, sir, so far as the practical working of the mill is concerned, it is as nearly correct as I could give it.

Q. Have you had any other experiences, Mr. MacVichie in the reduction of gold ores by the cyanide process other than the Golden Gate Mill, of which you are the superintendent? A. No, sir.

Q. Have you ever seen that process used anywhere until you came to that mill or district?

A. No, sir. I have seen the cyanide process at the Mercur mills and at the Geyser Marion mills of Mercur, as using the zinc shavings for precipitation.

Q. And how early did you observe these mills?

A. In 1896 I went through the Mercur mill, and since then I have been through all of the mills, including the Daisy mill of the West Dip a number of times.

Q. You say all the mills in the Mercur district?

A. Yes, sir.

Q. You visited the Mercur mill, the Daisy and the—

A. And the Sacramento.

(Deposition of Duncan McVichie.)

Q. And the Sacramento? A. Yes, sir.

Q. Have you made any comparison in the methods employed in these mills and in this mill employing the zinc dust method or process as to the cost—the length of time in accomplishing the end and the cost of the plant, to get the whole of it.

A. Yes, I have. Now, I have not figured this closely. I don't know of my own knowledge the cost of precipitation by zinc shavings at these mills, but by hearsay from their officers.

Q. You have seen the operation?

A. I have seen the operation and I have talked with their officers as to what it cost them to precipitate by zinc shavings.

Q. But you do not know of your own knowledge?

A. No, sir.

Q. Now, state, Mr. MacVichie, if you know, what the cost of zinc dust is in the market in New York?

A. \$8.88; no, \$8.82, it costs us laid down, now. I didn't segregate that as to what it costs in New York. It costs us \$8.82 laid down, a hundred.

Q. \$8.82 laid down at your mine, \$8.82 a hundred.

A. \$8.82 per hundred.

Q. That is what you pay for it laid down at the mill at Mercur? A. Yes, sir.

Q. Do you know the cost of the zinc shavings, the filiform shavings? A. No, sir.

Q. You don't know that? A. No, sir.

(Deposition of Duncan McVichie.)

Q. Can you state the cost of the zinc dust per ounce of free gold produced in that mill by the process as it is used by you?

A. In the month of December, 1899, we had a very good grade of zinc dust, and it cost us twenty-three cents an ounce to refine.

Q. I am not asking you that. I am separating. Read the question.

A. I have not got that segregated. I am unable to tell that now. I will get that later.

Q. What has been the cost of the zinc dust per ton of ore worked in your mill, the average cost since you have had charge of it, or from the beginning, if you can state it.

A. I can just give you four months which I have selected here, and I selected these four months, for the reason that we had different kinds of zinc dust during that time; for instance, we had in December, 1899, we had a very good grade of zinc dust and it cost us four and thirteen hundredths cents per ton of ore for zinc dust. In January, 1900, and February, we had an inferior zinc dust, and the cost was for January five and ninety-one one-hundredths cents, and for February eight and forty-two one-hundredths cents. For March, we went back to our former zinc dust, that we had always used in the mill up to January, 1900, and the cost for March was four and forty-four one-hundredths cents.

Q. Have you ever before, to your knowledge found

(Deposition of Duncan McVichie.)

any zinc dust as defective as this that you used in January?

A. No, sir, we always used the same zinc dust from the time that our mill went into commission until January, 1900, we bought zinc dust from another concern.

Q. When you got the zinc dust you had been buying before January, 1900, what was the cost? It was approximately four forty-five, was it?

A. Four and forty-four one-hundredths cents.

Q. You have given the cost of it in January, which was five ninety.

A. Yes, sir, five ninety and in February eight forty-two.

Q. Is there any labor saved in the use of zinc dust process as against the use of zinc shavings for the precipitation of gold.

A. Oh, yes; it takes a less number of men, a less number of attendants. It requires less attention in my judgment or from my observation.

Q. Are you able to state—now take your own mill where you are crushing or using from seven hundred fifty to one thousand tons of ore per day.

A. Yes, sir.

Q. And take another mill capable of crushing that amount of ore; what, in your judgment, would be the difference in the number of men and in the cost of using zinc shavings and in the process used now by your own, approximately?

(Deposition of Duncan McVichie.)

A. Well, I think it would take—my opinion is that it would take double the number of men to take care of it with zinc shavings, as it would with zinc dust.

Q. How many men have you engaged in the matter of precipitation? A. One man each shift.

Q. On the whole seven hundred fifty tons?

A. Yes, sir, there are three shifts.

Q. Mr. MacVichie, is there anything else in favor of the use of zinc dust for the purpose of precipitation, as against zinc shavings, any other economy or saving that you can name?

A. Well, I don't think it takes nearly as much room. There is a saving in the size of the building that would be required to precipitate by zinc shavings.

Q. I wish you would give some idea here how that is. What is the space required for the plant that you have and for a plant capable of doing as much business as yours does by the use of the troughs for zinc shavings? You say it would require a larger building. How much larger?

Q. We are precipitating in three tanks that are ten by twelve feet in diameter, as I remember them, about ten feet in diameter. They are situated just close enough together so that a man can pass between them. Now, in my opinion, it would require to precipitate that same amount of solution in zinc boxes, three times the size of that room.

Q. What advantage, if any, is there in the matter of refining the product produced by the process of zinc dust

(Deposition of Duncan McVichie.)

properly used, good commercial dust, and good zinc shavings?

A. I don't believe I am competent to answer that question, as I have never had the experience with zinc shavings.

Q. Do you know, as a matter of fact, whether or not in this western country, at any place, the product of zinc shavings derived from gold precipitated out of a solution of cyanide of potassium is refined, anywhere in this western country?

A. No, I don't know anywhere where it is. I know of my own knowledge that the Mercur Mining Company had attempted to refine their product, their precipitates which were by zinc shavings and failed. I know that of my own knowedge, that they failed twice.

Q. Where are these precipitates refined?

A. Kansas City.

Q. Is that the nearest market for them in this region of the country? A. As I understand it.

Q. Utah, Idaho, Nevada, and in this intermountain country, that is the nearest place, that you know.

A. That I know.

Q. Do you know any person or corporation engaging in the business of buying these precipitates, as an article of commerce, in this country?

A. No, I don't. These precipitates are sold direct to the Kansas City Smelting Works.

Q. Through any agency?

A. I don't think they have any agency here at all.

(Deposition of Duncan McVichie.)

Q. Is there any agency in this city?

A. Not that I know of.

Q. Is there any place in this city that I could sell cyanides—

A. I don't know of any. We were not able to sell our product here to the Kansas City people before we began to refine it.

Q. Do you know the cost of refining your cyanide product in the Golden Gate Mill which has been produced by the use of zinc dust, how much per ounce of gold produced?

A. Yes, sir. In the month of December, 1899, it was twenty-three cents; for the month of January, it was twenty-nine and three-fourths cents; for the month of February twenty-four and a half cents, for the month of March eighteen and a fourth cents. If you will remember, I told you that in January or February we had a poor zinc dust.

Q. I was just going to ask you how you accounted for the discrepancy as stated in that connection. How do you account for the discrepancy in the four months that you have given me?

A. By the poor zinc dust that we had during January and February or by the better during the other two months.

Q. Have you investigated the actual cost per ounce of gold produced, of the refining of that gold, for the months prior to those you have just given me?

(Deposition of Duncan McVichie.)

A. Yes, sir, we have all of them, every month, but I didn't bring those in.

Q. Excluding January and February, which you have given, are the other figures a fair average of the months going before that?

A. Yes, sir. That cost includes material and labor.

Q. Does that embrace everything.

A. Everything in connection with the refining.

Q. Do you market that gold bullion yourself to the Government, or do you do it through an agent?

A. Through an agent.

Q. What do they give you for gold that is eight hundred fifty fine and about?

A. I cannot give you those figures here. They are always attended to through our Salt Lake office.

Q. Can you give me approximately what the Government charges for the refining per ounce?

A. I cannot give you that.

Q. You may state, Mr. MacVichie, generally and in your own way what you find is the best course of business as to the matter of determining the amount of zinc dust that must be used for the precipitation of gold from its solution?

A. Now, that is a line of work that I don't go into. I go into it just this far: that if the consumption of zinc dust at the end of the month shows an increase, I inquire from our laboratory why it is, and that is as far as I go into those things.

(Deposition of Duncan McVichie.)

Q. Do you know of your own knowledge and from your own observation whether or not that fact is determined and acted upon practically in that mill by your employees, by the people in the mill?

A. Yes, sir; it is under the management of our metallurgist.

Q. And you know as a matter of fact that he did?

A. It is watched very closely.

Q. By him? A. Yes, sir.

Q. Mr. Sherrod has charge of it? A. Yes, sir.

Q. And you know that he behaves accordingly as to the matter of ascertaining the amount?

A. Yes, sir.

Q. Have you any objection to stating the amount of gold that was obtained from that ore for the months you have given me there, and of the cost of zinc dust per ton of ore—you need not if you don't want to?

A. I would rather not give it.

Q. I want you to give me then the cost of zinc dust per ounce of gold; just make that up. A. Yes, sir.

Q. Give me the cost in the Golden Gate mill of zinc dust per ounce of gold produced by that mill.

A. Fourteen cents.

Cross-Examination.

(By Mr. JOHN H. MILLER.)

Q. How many attendants are required to run the precipitation room where the filiform zinc is used instead

(Deposition of Duncan McVichie.)

of the zinc dust, the precipitation room being the same room as your precipitation room.

A. There is one man employed in mills that are treating one hundred fifty tons per day.

Q. One man on each shift, I suppose you mean?

A. Yes, sir.

Q. And it was from the fact that one man was employed on one hundred fifty tons per day—and you judge from that fact that if seven hundred fifty tons per day were running, it would require three times or twice as many as were required in your process?

A. Yes, sir, it would require more men; there would be so much ground to cover. The boxes would cover quite a large area.

Q. If you were running only one hundred fifty tons per day through your plant you would still require one man for each shift, wouldn't you?

A. No, the time to attend to the precipitation of the plant is so little, that a man could be employed at other work as well.

Q. How many filter presses do you use?

A. I don't remember the number. I think either nine or twelve.

Q. And about what is the cost of each of them?

A. I cannot give you those figures.

Q. I understand you have had no practical experience with the process where the filiform zinc is used.

A. No, sir, only from observation.

(Deposition of Duncan McVichie.)

Q. Only from observation up in those mills around you? A. Yes, sir.

Q. They are using that in the Mercur mine, I understand, in the Mercur mill. A. Yes, sir.

Q. And what is the capacity of that mill per day?

A. I understand they have a capacity—recently have increased their capacity to six hundred tons. I have not been in the mill since they increased the capacity.

Q. How long have they been using that process in that mill? A. Four years to my knowledge.

Q. And they are still using it now?

A. Yes, sir.

Q. That is what is called the MacArthur-Forest process? A. Yes, sir.

Q. And what is it that they use?

A. Zinc shavings.

Witness excused.

I have corrected the foregoing report of my testimony on page number six in reply to question number four by the following answer: Yes; the Kansas City Smelting and Refining Company buy zinc cyanides at the time I had in mind, the slag, which is one of the products of refining the precipitates of cyanides.

D. McVICHIE.

Mr. F. P. SWINDLER, being first duly sworn, testified as follows:

Direct Examination.

(By Mr. A. C. ELLIS.)

Q. Please state your name, residence, business or occupation.

A. Frank P. Swindler; residence, De Lamar, Nevada; profession that of general superintendent of De Lamar's Nevada Gold Mining Company.

Q. Where is that property situated?

A. In De Lamar, Nevada.

Q. Have you had experience in the art of metallurgy and milling of ores of gold or of gold and silver in combination, and if you have, please state your experience, embracing the length of time you have been engaged in it and at what different places in the matter of the reduction of ores carrying precious or other metals, and the different processes with which you are familiar.

A. I am familiar with gold amalgamation and concentrating, which, however, have nothing to do with this case, and I have had sixteen months' experience in my present capacity; that is only thirteen months as general superintendent and three months prior to that I was assistant superintendent.

Q. State the capacity in tons of the mill of which you are the superintendent.

A. Nine thousand tons per month is the average.

Q. What character of ores does that mill treat?

A. Silicious ores carrying gold and silver.

(Deposition of F. P. Swindler.)

Q. Are they ores that you would denominate free ores or do they occur in base metals?

A. In a very small degree. There is some copper.

Q. What percentage of copper in the whole mass of ore?

A. It is so little that we don't make any determination of it. It is more a copper stain than anything else. It does sometimes show in the bullion slightly.

Q. Would it be a fraction of one per cent?

A. A very small fraction of one per cent.

Q. What process do you employ there for the extraction of the gold from the ore.

A. What is commonly known as the cyanide process.

Q. Have you familiarized yourself with that process, with the cyanide process, the recovery of gold from a solution of cyanide of potassium? A. Yes, sir.

Q. Are you held responsible in your official capacity for the operation of that mill and for the results obtained? A. I am.

Q. You have been in charge of that mill absolutely for thirteen months and as assistant superintendent and general superintendent for sixteen months.

A. Yes, sir.

Q. Have you observed other mills in your experience in dealing with the subject, where they employed the electrolytic process, using zinc shavings?

A. In the April Fool mill, which adjoins our property, they employ that process.

Q. Have you become somewhat familiar with the results obtained there and the method?

(Deposition of F. P. Swindler.)

A. I have.

Q. That is using zinc shavings? A. Yes.

Q. You have seen zinc dust? A. Yes.

Q. Do you purchase it for use in that mill?

A. We do.

Q. Are you able to state the market price of that at the point where it is purchased?

A. It costs within a fraction of ten cents per pound delivered.

Q. And do you know what it costs at New York?

A. I don't. It is purchased through our purchasing agency at Salt Lake City.

Q. How far distant from any railroad is this mine, or navigable stream.

A. Seventy-five miles from the end of the track of the Utah & Pacific Railroad.

Q. State how you reach that mine. How does your freight go there?

A. We take the Oregon Short Line to Milford and then from Milford to Uvada, or a distance of seventy-five miles, on the Utah & Nevada road.

Q. And the rest?

A. By wagon freight.

Q. So that zinc dust has to stand transportation by rail from New York to Uvada? A. Yes.

Q. What is the distance from Salt Lake to Uvada, about?

A. Two hundred ninety-five miles, I believe.

Q. And the distance by wagon freight from the terminus to De Lamar? A. Seventy-five miles.

(Deposition of F. P. Swindler.)

Q. Do you know the wagon freight from Uvada to this mine? A. Seventy-five cents per hundred.

Q. And the zinc dust laid down there costs ten cents?

A. Ten cents.

Q. And how do you buy it?

A. Buy it by the cask, about sixteen hundred pounds in the cask.

Q. Do you buy it by the carload?

A. No, we get our supply from that purchased for the Golden Gate mine at Mercur.

Q. And it comes out in casks that hold about sixteen hundred pounds? A. Yes, sir.

Q. I wish you would describe, Mr. Swindler, the method of reducing the ores in that mill by you.

A. Do you want my language?

Q. Yes, run through it in your own way.

A. The ore is brought from the mine by train and dumped into a large receiving bin, from which it goes to the rock-breakers and from the rock-breakers to the distributing bins connected with what are called Griffin mills. There it is reduced to a very fine pulp, about sixty per cent of which would pass an eighty mesh. It is crushed dry and from this it is conveyed by conveyor belt or elevator to the distributing bins in the cyanide department. It is there distributed by cars into the tanks and is subjected to the cyanide solution; after remaining there a certain length of time, which is determined of course by assaying the pulp to see that the values are extracted, the solution is drawn down into what is called

(Deposition of F. P. Swindler.)

the drip tank or, rather, into vacuum cylinders first, and then the drip tank, which is an aurol solution, and thence it is pumped to our precipitating tanks on the second floor of the drip tank building and is there precipitated with zinc dust. The tanks are first filled with the solution, and the zinc dust is thrown on the surface of the solution from a shovel and the air turned on and agitated about four or five minutes. It then immediately passes down into the filter presses. These filter presses are taken down when they are full; that is determined by experiment of course; we know about what time to take them down, and the product of that is placed in the lead lined tanks and the excess zinc cut out by dilute solutions of sulphuric acid. From there after freeing, washing and removing the acid, the excess acid from the product, it is taken to roasting furnaces, what we call the roasting furnace, in pans and placed in cast iron muffles and roasted, and then is fluxed and melted and run into slag pots, from which we get buttons, and then remelted again and run into bars. That is, briefly, the process.

Q. Now, you put this zinc dust on the surface after the precipitating tank is filled, the amount of the solution that you intend to carry and at the same time turn on the air. A. Turn on the air at the same time.

Q. How is that air handled?

A. Of course, we get this air from our air compressor receiver, connected with a rubber hose and a piece of gas pipe on the end of the hose, and the precipitator or the man who handles this manipulates this for probably a

(Deposition of F. P. Swindler.)

minute about the tank and then lets it remain there for four or five minutes longer.

Q. Lets the pipe remain there?

A. And the air passing through.

Q. Does that agitate the entire body? A. Yes.

Q. What is the entire length of time before you consider it precipitated?

A. It will average five minutes.

Q. Then you let it rest?

A. Then immediately a plug valve in the bottom of the tank is opened up and it is allowed to flow down into the filter press-room.

Q. You don't permit it to settle at all?

A. No.

Q. And from the filter presses you gather it up?

A. Gather it and cut it with the acid.

Q. In the lead lined tank and cut it with the acid. By putting in sulphuric acid alone without any nitric. Do you put it in dilute?

A. There is a quantity of water turned on first and then the acid is put into that.

Q. You take up any silver? A. No silver.

Q. The silver is left in the precipitation?

A. Yes, sir.

Q. The character of the bullion which you made, the average, would you state?

A. The melt we just completed, the day before I left, which was Monday, ran about nine hundred twenty fine,

(Deposition of F. P. Swindler.)

that is of course silver and gold, of which about three hundred forty fine was gold and the balance silver.

Q. It was nine hundred twenty, gold and silver, Doree bar? A. Doree bar.

Q. Mr. Swindler, will you be kind enough to state what the consumption per ton of ore of zinc is by the use of the zinc dust method as you have described?

A. It is about four ounces of zinc dust to the ton of ore, treated.

Q. Four ounces?

A. It costs two and fifty-eight one-hundredths cents per ton of ore treated, which would make it cost about four and six-tenths cents per ounce of gold—that is, calling this Doree bar all gold. For instance, if we had a bar that was worth twenty thousand dollars, that would be gold and silver together, and if all gold just for the sake of determining the cost per ounce—

Q. All gold?

A. Yes—it would cost four and six-tenths cents per ounce.

Q. That is, if you had five thousand dollars in silver and fifteen thousand dollars in gold in the bar, the gold value in that bar would have cost you in the consumption of zinc how much?

A. Four and six-tenths per ounce.

Q. And per ton of ore, are you able to state how much the zinc would be?

A. Two and fifty-eight one-hundredths cents per ton of ore.

(Deposition of F. P. Swindler.)

Q. Do you know from your own knowledge of the use of zinc shavings or any other form of zinc as a precipitate what the amount of zinc consumed would be per ton of ore, where the ore is of like character?

A. I only know from seeing the cost sheet of the April Fool Mining Company which adjoins us.

Mr. MILLER.—We object to that evidence on the ground of hearsay.

A. Well, I saw their bills.

Mr. MILLLER.—Yes, but that is not competent evidence. I don't dispute your word at all but it is not competent.

Q. State what method, if any, you have or have adopted for the determination of the amount of zinc dust to be employed for the precipitation of gold and silver from that solution of cyanide of potassium?

A. The chemical solution question—I never went into the metallurgical question. That was all determined before I went there and our products or headings are of such uniform value that we have never found it necessary to change our proportion.

Q. Assuming that as a basis, state what is your practice or the practice of the people in charge of that branch of the business in the matter of adding zinc dust.

A. We uniformly use three and a half pounds of zinc to three tons of the gold solution.

Q. When you say zinc do you mean zinc dust?

A. Zinc dust, and we have never been obliged to change that.

(Deposition of F. P. Swindler.)

A. The ore being of uniform character, and of particularly uniform value, you have pursued that course.

A. That is the average amount of zinc that we use. Of course on the clean-up at the end of the month we put in a little more. Every tank is cleaned up, and whatever may have been deposited in the bottom of the precipitating tank may not have gone down into the press is cleaned up and then we add a little more perhaps for two or three days. We may add four pounds to the tank. That depends a good deal upon the assay value of our tailing solution.

Q. What is the object of adding more towards th end?

A. There is a slight amount that is deposited there that is used over and over again by the agitation. It accumulates there, don't go through the pipe, and as we use an excess, always have a slight excess there as I have stated.

Q. What do you mean by excess of zinc dust?

A. More than the books, the chemical equation would say was necessary.

Q. Is it about a uniform excess? A. Yes.

Q. So that excess is a definite excess?

A. It is definite.

Q. Will you explain the philosophy of the use of a slight excess?

A. To be positive that there is enough.

Q. As to the chemistry, you don't enter upon that?

A. We don't there.

(Deposition of F. P. Swindler.)

Q. Do you assay your tailing solution?

A. Twice a day.

Q. Then it is determined by that whether all the values have been precipitated or not, if it should require any more. I understand your experience has been, the value of the ore being uniform, you having previously ascertained that this definite amount would answer, you have continued to use it.

A. At one time last spring we had a little trouble. I don't know that it is pertinent to this cause at all, to this testimony. We had a little more copper than usual, probably that lost some of the solution, probably the ore was a little acid, and then we added for several days four or five pounds of zinc dust to the tank. That is, we also increased our standard solution and added a little more zinc dust to precipitate it. That was due to the presence of copper or acid ore perhaps.

Q. In other words, you had more bulk metal to deal with?

A. And also a stronger solution for a few days.

Q. Have you examined and do you know what it costs you, costs the mill company to refine the product?

A. Very closely. We do not keep a separate refinery account there, because it merges into the assay office. There is only one man required constantly in the refinery—that is other than the assayer and his assistant. It is his wages, plus the cost of the zinc dust, plus the cost of the acid—

Q. You have factors there in the estimate that I

(Deposition of F. P. Swindler.)

don't need. You have added there the wages of one man in the refinery, plus the cost of the zinc dust plus the cost of filtering. Now, excluding the cost of the zinc dust and leaving such other factors as go to the refining exclusively, what would be the cost of refining that bullion, that product, per ounce. I mean per ounce of gold value.

A. You mean if we carry that silver value into it? It would be about nine and a half cents.

Q. Your cost of refining? A. Yes.

Q. And you have taken out of that the cost of the zinc dust?

A. No, put the zinc dust in, and the one press-room man and $90.00 cost of fuel, it would amount to about four hundred forty-two dollars, which would be about nine and two-tenths cents per ounce.

Q. I want you to take out the cost of the zinc dust; that goes to cost of precipitation.

A. Cutting that out, it would be a little over four cents per ounce.

Q. To make that four cents, you have charged for that account of refining the wages of one man; you have charged for all; you have charged for the sulphuric acid?

A. Yes, sir.

Q. Filtering goes to the mater of roasting and melting.

A. I also know the round numbers. It does not cost to exceed twelve cents per ounce and that is all the cost of refining.

(Deposition of F. P. Swindler.)

Mr. SAFFORD.—From the time it comes into the precipitation tank?

A. No, from the time it comes from the press.

Q. Excluding the zinc dust it cost four and a half cents?

A. I have not added anything here for chemicals or fluxes. You see we keep our accounts down there in the cost per ton of ore, and now I am segregating it since you spoke of reducing it down to cost per ounce of gold produced.

Q. Of gold value produced? I ask you to make that calculation as to how much per ounce of gold value of bullion produced it costs you exclusive of zinc dust, because that goes to precipitation.

A. I will state that it will not exceed twelve cents per ounce. It cannot exceed that from the data that I have at hand, the cost per ton of ore for the process.

Mr. SAFFORD.—You don't mean for the ounce?

A. No, I have the cost per ton of ore. We keep our accounts in that shape, per ton of ore. Then I reduced it to per ounce of gold value and gave it that, except the zinc dust, four and six-tenths cents per ounce of bullion. So I make that explanation.

Q. Now, you have it there four and six-tenths cents per ton of ore for the cost of zinc dust?

A. Yes, sir.

Q. Now, eliminate everything save and except the precipitates, after all the operation is over and through

(Deposition of F. P. Swindler.)

the filters; what does it cost to refine the precipitates that you would otherwise ship to market as bullion?

A. About seven and a half cents per ounce.

Q. To refine the bullion instead of shipping it?

A. Yes, sir. I probably should qualify it somewhat by saying that, that the assayer and the assayer's assistant assist on melting days, and so get at it exactly that way and put it at not to exceed twelve cents, as their time should be charged at the number of hours that they work at this business.

Q. Now, the proposition that I made is really a very simple one. You have got it down to precipitates and I want you now to not ship that but reduce it to gold bars.

A. Seven and a half cents. It will not exceed it.

Q. That is what I thought, seven and a half cents.

A. Our sulphuric acid there only costs us seventeen mills per ton.

Q. From your observation of the use of zinc dust and from your observation of zinc shavings as a precipitate in mills that employ zinc, is there any other advantage that you could state in favor of the use of the zinc dust as a precipitate?

A. Yes, in controlling the amount of the zinc used so that it won't enter into the melt, where it would interfere with the melting by producing a matte. The zinc dust is so finely divided, it is more easily got at with the acid. I think it would be impossible practically to get all the zinc shavings out of the acid. It takes so long a

(Deposition of F. P. Swindler.)

time. The April Fool Company are now reducing their bullion, though it is a filiform product. They get at it this way. They take it out of the last box and manipulate it and work it through an eighty mesh sieve, and in that way get the particles of zinc out and return them to the boxes, but even with that method, they have had a good deal of trouble, and on one occasion had to come over to our place for assistance in reducing their bullion on account of the zinc.

Cross-Examination.

(By Mr. JOHN H. MILLER.)

Q. What is the value per pound of your precipitate before you refine it?

A. About sixty dollars. It will vary from fifty-five to sixty-three dollars. We have a very high grade product there.

Q. That is a higher grade product than is made at Captain De Lamar's Mercur mine?

A. Our ore is of a higher grade, and then it is probably due—however, that probably has nothing to do with this case—due to our stronger solution.

Q. What do you mean?

A. We use a stronger solution of cyanide than they do.

Q. What is the value of the bullion when it is ready for sale? A. Do you mean per pound?

Q. Yes, per pound.

A. It will run from anywhere from $103.00 to $110.00

(Deposition of F. P. Swindler.)

per pound. We produce what is called Doree bullion. That is, there is more silver in weight in the bar than of gold, although the gold is larger in value.

Q. About what is the percentage of silver in the Doree bar?

A. It will go two and a half—let me see; just wait a minute. In weight it goes about three to five, the ratio of three to five; that is, three pounds of gold to five pounds of silver.

Mr. SAFFORD.—About three-eighths of silver in weight, not of value.

A. In weight, not in value. It will probably be a little more than that. You will see—this melt was 340 average of gold ore; fineness was 920. That is probably it. Leaving off the fractions three to five.

Q. How many filter presses do you use?

A. Three.

Q. Do you know what they cost?

A. I think they cost something like four hundred and fifty dollars.

Mr. SAFFORD.—Each?

A. Yes. They were bought before I went there. That is my impression but that would be easily got by a catalogue.

Q. They are a necessary part of your system?

A. Oh, yes. That is yes and no. One could allow that precipitate to settle itself in the tank and then decant the solution.

(Deposition of F. P. Swindler.)

Q. That would be more expensive than the present method?

A. No, it would be more bother and more trouble.

Q. Take a longer time?

A. Of course. You would have to learn by experiment how long it would take that to settle. You take that precipitate as it comes down in a beaker and place it aside for an hour and it is apparently all precipitated in the bottom.

Q. I understand you to say that when you went to the mine as superintendent it had already been determined how much zinc dust would be used for each tank. You have never changed that?

A. A very little sometimes in the beginning of the first of the month and that is determined—for instance, we make a solution and assay on the first of the month, and find that we are running a little high, and then we add a little zinc until we get that down.

Q. This attendant simply takes up a shovel of the dust and throws it in?

A. He has a little measure and each one full is a pound of zinc dust. He takes three and a half of these measures and puts it in a shovel and throws it around over the surface, at the same time turning on the air.

Q. If you were commencing to use this process for the first time, how would you determine the amount of zinc dust to use.

(Deposition of F. P. Swindler.)

A. I would determine it as all metallurgical processes are determined—that is, by experiment; that is, the meat of all of them is experiment. You take the cyanide process—it is usually determined in a laboratory.

Q. But if your ore was not uniformly averaging you would have too much or too little.

A. The daily assays would show that. If the solutions showed values—that is, if what we call the tailings solution showed values, there would be a little more zinc dust added.

Q. That is, the zinc dust would vary in quality?

A. As I said before, we get our zinc dust through the shipments made to Mercur and their chemist out there determines the quality.

Q. I am referring to the zinc dusts of commerce. Do they vary?

A. I take it it would depend entirely upon the elements contained in the ore from which the zinc dust is secured—that is, one district might not produce as good an article as another.

Q. That would cause the different articles of dust on the market?

A. Certainly; and the manufacturers of cyanide vary. We make a test of each shipment of cyanide they send us.

Q. Did you ever analyze this zinc dust?

A. Not personally. Our assayer down there did.

Q. At your mine?

(Deposition of F. P. Swindler.)

A. Yes, sir, he has done so. We have not found it necessary, inasmuch as the determinations are made up here and we don't use as much as they.

Q. What is the capacity of the April Fool mill that you spoke of?

A. About seven hundred tons per month.

Redirect Examination.

(By Mr. A. C. ELLIS.)

Q. You have testified to the method of agitating the solution upon the introduction of the zinc dust, by the use of compressed air through a pipe inserted in the solution. Have you in practice ever used any other method of agitating the solution? A. Yes.

Q. If you have, please state that method.

A. Our air compressor was broken down about twenty-four hours, and it became necessary to find some other means of agitation. So we simply used a long paddle and agitated it by that means for about fifteen minutes instead of four or five minutes, as when we used the air, and accomplished the same results.

Q. What do you mean by accomplished the same results?

A. That is, we agitated the zinc dust, so that it was brought into intimate contact with the solution and the values precipitated.

Q. Are you able to state whether or not there was as good a precipitation when thus agitated as when agitated by the compressed air?

(Deposition of F. P. Swindler.)

A. There was. Of course, it took longer.

Q. It took fifteen minutes in that case as against five ordinarily.

Recross-Examination.

(By Mr. JOHN H. MILLER.)

Q. How long did you use these paddles on the occasion referred?

A. For a period of about twenty-four hours that the air compressor was down.

Q. And as soon as the compressor was repaired, you went back to that process? A. Certainly.

Q. You found the compressor method preferable on account of the less time required?

A. Yes, and less labor required also, less manual labor.

Q. What was the difference in manual labor in the two processes.

A. In using the compressed air it was necessary for the precipitater to use his air and nozzle about a minute before laying it down, and letting the operation continue by the air itself, but with the paddle it was necessary to continue agitating about fifteen minutes.

Q. I presume he simply took a paddle in his hands and stirred the water?

A. Simply stirred it; a long paddle shaped like an oar, an ordinary rowing oar.

Q. And in that process he had to continue the process during the entire fifteen minutes.

(Deposition of F. P. Swindler.)

A. Much longer; yes, sir.

Witness excused.

On May 3d, 1900, an adjournment was taken to May 4th, 1900, at which time at the same place as theretofore, the following proceedings were had:

It is admitted by the counsel for the defendant that if Mr. A. G. Safford had been called as a witness, he would have testified—the case to be heard as if he had so testified—as follows: "The zinc dust furnished by Mr. Safford to the witness Hendricks and the witness Whitehead was obtained by him from Professor Munroe of Columbia University. He applied to Professor Munroe for zinc dust, such as he, Munroe, used in his laboratory, and such as is ordinarily sold in the markets, and it was delivered by Mr. Safford to the witnesses in the same condition it was received by him from Professor Munroe."

It is agreed by Mr. J. H. Miller, representing the respondent, and by counsel for the complainants, that the signatures of all the witnesses called or to be called are waived; or that they may be appended to their testimony respectively without the presence of the examiner or counsel, provided that if any witness shall make any material change in the testimony delivered by him before the examiner the right to further cross-examine by counsel is reserved; such changes, if any other than verbal corrections, are to be noted at the end of the deposition of the witness.

Mr. GILBERT S. PEYTON, a witness produced, sworn, and examined on behalf of the complainant, testified as follows:

Direct Examination.

(By Mr. A. C. ELLIS.)

Q. Mr. Peyton, what is your full name?

A. Gilbert S. Peyton.

Q. What is your age, residence and business?

A. Forty-three; reside at Salt Lake; mining.

Q. How long have you been engaged in mining, Mr. Peyton? A. Ten years.

Q. In what locality?

A. Well, sir, almost entirely in the Mercur district.

Q. In Utah? A. Yes, sir.

Q. Have you made yourself acquainted with the methods of reducing gold ores by the cyanide process?

A. Yes, sir.

Q. At what place? A. At Mercur.

Q. When did you first become acquainted with that process? A. Ninety-one, I believe.

Q. By that process, I mean the extraction of gold from a solution of cyanide of potassium. A. Yes.

Q. At what mill? A. The Mercur mill.

Q. On the ores of what mine?

A. The Mercur mine.

Q. You say at the Mercur Mine you had your first experience? A. Yes, sir.

Q. How long had you known anything of the process

(Deposition of Gilbert S. Peyton.)

of recovering gold from a solution of cyanide of potassium before this. A. Never heard of it.

Q. Was that the first works in that district that used the so-called cyanide process? A. Yes, sir.

Q. Who was in charge of the mill at that time?

A. I was.

Q. How long did you so remain in charge?

A. I think about a year and a half.

Q. Had you ever seen the cyanide process with the recovery of gold in any way before that time?

A. I had not. That is, I will make the statement here that my first experience was at an experimental mill not at the Mercur mill here. Of course, I wanted to make my tests first.

Q. In that district?

A. It was the district here, the Mercur district, the Mercur ores that I made the experiment on.

Q. Was that process applied or used for the first time, so far as you know, in the Mercur district and upon the ores of the Mercur Mine?

A. Yes, sir, I was the first fellow to make the experiment in the district.

Q. Do you know of any other district where any such use had been made of the process in the United States? A. I do not.

Q. Prior to that? A. I did not.

Q. In other words as you understand, the Mercur mill was the pioneer mill in the United States.

(Deposition of Gilbert S. Peyton.)

A. The first mill in the United States, the whole west.

Q. What was the capacity of the mill at the time that you had charge of it from ninety-one on?

A. It varied from fifty to eighty tons per day.

Q. Was it enlarged during your administration?

A. Not greater than eighty tons.

Q. Did you remain interested in the property after the increase of the mill in its capacity?

A. Yes, sir.

Q. Were you connected with it in any business way?

A. Nothing, simply a stockholder.

Q. Were you as a stockholder in the corporation?

A. That is all.

Q. Have you used the cyanide process upon the ores of any other mine in the district or elsewhere, since?

A. I have.

Q. What mine? A. The Overland.

Q. Where is that?

A. That is in the Mercur district.

Q. How far distant from the Mercur Mine is that property? A. Four miles.

Q. Is there a mill established in connection with that mine, for the reduction of the ores of that mine?

A. Yes, sir.

Q. What is its capacity?

A. Two hundred tons per day, being increased to five hundred now.

(Deposition of Gilbert S. Peyton.)

Q. Upon the ores of that mine, the cyanide process has been used too? A. Yes, sir.

Q. Any other process? A. No, sir.

Q. How long has that mill been in operation under your supervision? A. Six months.

Q. Are you familiar with the price of zinc shavings in this region? What do they cost laid down here or made here.

A. Well, if you have them made here, here in the city, they cost you about twenty-five cents per pound.

Q. Has that been about the price throughout the years you have been here? Has it varied and if so how much?

A. I have paid as high as fifty cents per pound for it.

Q. Have you paid less than twenty-five cents?

A. No.

Q. That is the minimum price?

A. The minimum price, I take it.

Q. Have you bought them in large quantities?

A. Not very large.

Q. Sufficient to run those two mills.

A. No, I never bought any only for the new mill. Always made our own.

Q. Well, then, what does it cost you to make them where you use your own lathe?

A. Where we use our own lathe, I suppose the actual cost of the zinc—it now costs us about nine and a half cents laid down—perhaps it costs twelve cents all told.

Q. Where you manufacture them yourself?

(Deposition of Gilbert S. Peyton.)

A. Yes.

Q. What has been in your experience, the consumption of zinc per ton of ore.

A. Well, it will vary all the way from one-fourth to one-half pound per ton of ore.

Q. That is consumed and done away with?

A. Yes, consumed and it is gone.

Q. Why is there such a variation as from a quarter to half a pound?

A. That is due to different, you might say different things. For instance, take one mine, you may have some substances that the cyanide dissolved to some extent as well as the gold precipitates in the shavings and takes possibly more zinc, and there may be a variation in the ore with regard to values and that makes some difference.

Q. It depends upon the character of the ore?

A. Yes, sir.

Q. Would there be much difference as to the increase of gold? A. Very little.

Q. The contained gold would not make very much difference? A. No, sir, very little change.

Q. What is the consumption per ton of ore in your experience there of cyanide of potassium?

A. The consumption of cyanide?

Q. Yes, sir, this solid as you buy it in a barrel.

A. That will vary as regards the ore all the way from one-third of a pound up to a pound. A pound is a

(Deposition of Gilbert S. Peyton.)

pretty heavy amount, and I have gone even as low as a fourth of a pound.

Q. Is that dependent in any degree upon the character of the ore and the richness of the ore in gold?

A. Well, the gold does not cut much figure. It is some foreign substance.

Q. You had fairly free ores in the Mercur mines at one time—that is, free from any foreign substance?

A. Very clear from any substanec.

Q. In case of such ores, what would be your experience as to the loss of cyanide per ton of ore treated?

A. Well, half a pound.

Q. Half a pound of cyanide and a quarter to half of zinc? A. Yes.

Q. I wish you would describe in your own way and as briefly as you can the process of the recovery of gold from its solution of cyanide of potassium—that is, describe the process of the general reduction of the ores, from the crushing to the recovery.

A. You want it from the starting out point?

Q. Yes, just briefly to the recovery of the product itself.

A. Well, my work has mostly been to crush the ore in very coarse, you might say, and to put a solution containing what we term one-fourth of one per cent solution, and that passes through the ore, and from there it is passed through boxes containing zinc shavings. These boxes vary in regard to number in accordance

(Deposition of Gilbert S. Peyton.)

with the amount of solution that we want to pass through them.

Q. Now, describe the boxes. What is the length of them and the number of boxes required?

A. The length of the boxes I have been using about eighteen inches by eighteen by twelve. A row of these boxes will contain seven boxes.

Q. What is the length of each box, did you say?

A. That would be seven times eighteen inches, that would give you the number of inches.

Mr. SAFFORD.—How many of such series of boxes would you require for an eighty ton plant?

A. Let's see. Two rows will take care of eighty tons, two rows of those boxes.

Mr. SAFFORD.—That is fourteen?

A. Yes, sir, fourteen.

Q. And it would be in that proportion throughout?

A. Yes, sir.

Q. And a two hundred or a four hundred ton mill it would increase at that rate?

A. Yes, keep that proportion.

Q. You have got your solution, you say, through the solution—through the tanks into these boxes filled with zinc shavings? A. Yes, sir.

Q. Well, explain how full you put these boxes of shavings and how you put it in.

A. These boxes, about an inch and a half from the bottom, have a screen, and on top of that we put the

(Deposition of Gilbert S. Peyton.)

shavings, and we fill the box full, and of course the first box becomes enriched faster than the others, and as that settles down we move the zinc shavings up from the box below to the box above and then add more new zinc to the bottom box.

Q. And so on until the operation is complete.

A. Yes, sir.

Q. What length of time, as a rule, do you permit the solution, or is it permitted to pass through these boxes of zinc shavings before the product is cleaned up?

A. How long, do you say?

Q. Yes, about.

A. That would depend entirely upon the richness of the ore and the amount. Generally make a point to clean up twice a month.

Q. Upon what grade of ores were you in the habit of doing that—per ton?

A. About five or six dollar ore.

Q. Did you do it as often as that or less frequently when you had twelve or fifteen dollar ore?

A. Of course, you can clean up there once a month, on small tonnage.

Q. And you can carry it on indefinitely, in other words? A. Yes, sir.

Q. You used to allow the solution to percolate through the zinc shavings for a period of two weeks, before there was a clean-up?

A. Yes, sir, and when cleaned up simply what you

(Deposition of Gilbert S. Peyton.)

might term a slime. They had all been cut down into slimes, into very fine stuff.

Q. That is, the gold has largely replaced the zinc and taken that form?

A. Taken that form, what we call slimes although there is a very small percentage of gold in it.

Q. As the operation goes on, the solution passing through the zinc boxes, the bulk of the zinc shrinks?

A. Oh, yes, it is continuous.

Q. And you continue to put the boxes immediately below in the boxes above, adding zinc to the lower boxes all the time until the operation is complete.

A. Yes, it is a continuous operation.

Q. You keep supplying fresh zinc as the zinc is consumed by the solution? A. Yes.

Q. Now, is it a fact that the solution, the cyanide solution, is thus kept as it flows continuously in contact with the zinc shavings for a period of say fifteen days before there is a final clean-up?

A. I don't know as you understand me. The solution is flowing as we use it on the zinc, constantly flowing over these boxes all the time. We will usually take off just one row of boxes or part of a row of boxes to clean up and then it continues and goes on again.

Q. But the cyanide solution is in contact or flows through the zinc for a period of fifteen days before there is a final clean-up. You don't take up any boxes, do you?

(Deposition of Gilbert S. Peyton.)

A. That may be construed in this way. I don't know that I understand you. Mind you, it is not the same solution that passes through the boxes for fifteen days. It is a continuous stream that is being replenished at one end; as it comes from the tank here it contains gold; and goes into the standardizing tank to receive more cyanide.

Q. The solution that passes over the zinc shavings, after it has passed all the boxes from the head to the foot, is pumped back into the treating tank?

A. It flows into a tank and it is what we call standardized and from there it passes on over the ore again. We don't pump it back at all. What we pump back is after it has gone over the ore and got ready to go through the zinc; in other words, we pump back the solution that takes the gold.

Q. It flows from these boxes into a tank and having lost some of its cyanide of potassium is restandardized to the standard which is a quarter of one per cent in this case? A. Yes, sir.

Q. And then it passes on to the ore again and not directly on the zinc boxes again, but not until it passes over the ore.

A. Through the ore every time it passes the zinc boxes.

Q. New ore? A. No, not new ore.

Mr. SAFFORD.—Is the zinc retained in the boxes in a quiescent state from one clean-up to another, the zinc shavings?

(Deposition of Gilbert S. Peyton.)

A. You mean the zinc shavings remain in these boxes until cleaned up?

Mr. SAFFORD.—Yes. A. Why, yes.

(By Mr. A. G. SAFFORD.)

Q. What was the average value of the cyanide product?

A. Oh, it will vary from twenty to twenty-five dollars per pound.

Q. What did you do with this product? How did you dispose of that?

A. We generally disposed of them through the smelters.

Q. You disposed of them to outside parties?

A. Outside parties; yes, sir.

Q. At a fixed price? A. Yes, sir.

Q. What was the price per pound that you received for this—for your products?

A. Well, we received all the way from nineteen dollars to twenty dollars per ounce.

Q. Different prices at different times?

A. Yes, sir.

Q. And what is the present amount paid?

A. $19.75, I believe now.

(By Mr. A. C. ELLIS.)

Q. What other expenses were you subjected to, if any, in addition to the reduced prices that you received for your gold in marketing it, in marketing the product?

A. Express charges.

(Deposition of Gilbert S. Peyton.)

Q. What were those express charges?

A. Well, I have forgotten exactly, but it seems to me it was in the neighborhood of five or six dollars.

Q. Per hundred pounds?

A. Per hundred pounds and a valuation of about a dollar and a half per thousand, as I remember it.

Q. Express charges to what place?

A. To any Missouri River point.

Q. Was that the only market available to you, some market on the Missouri River or near there?

A. Well, we have sold it further east.

Q. Omaha or Kansas City was the usual place?

A. The usual place.

Q. Have you ever sold to Europe? A. No, sir.

Q. When you sold further east what, if any, additional expenses were you called upon to pay.

A. Well, there would be the difference in express rates; that is all.

Q. The increase? A. The increase, yes.

Q. The amount per ounce of gold would be about the same? A. Well, about the same.

Q. Have you ever used zinc dust for the precipitation of gold from the solution of cyanide of potassium?

A. I have not.

Q. Did you ever hear of zinc dust being used at any time prior to September first, 1894? A. No, sir.

Q. Were you engaged in pursuing, seeking to obtain information on the subject of ore, of recovering gold from a solution of cyanide of potassium?

(Deposition of Gilbert S. Peyton.)

A. Yes, sir, I have made a good many experiments.

Q. Did you undertake to read up the literature, all the books issued on the subject?

A. I expect I did at the time that I was interested.

Q. And you never heard of the use of zinc dust for this purpose prior to September, 1894?

A. I think not.

Q. Did you ever hear of it prior to 1898?

A. I think so, it seems so.

Q. But not prior to September, 1894? A. No.

Q. Do you know anything about the product produced by the use of the zinc dust from your own experience? A. I do not.

Cross-Examination.

(By Mr. J. H. MILLER.)

Q. What year was it, Mr. Peyton, that you introduced this cyanide process at Mercur?

A. I think it was in 1891.

Q. At that time, you were cyaniding the district ores, were you?

A. No, it was at the Mercur mill you know. It was the original Mercur mill that was put up for amalgamating.

Q. You commenced the process then at the Mercur mill? A. Yes, sir.

Q. Were there any other mines in operation around there at that time? A. No, sir.

(Deposition of Gilbert S. Peyton.)

Q. So you were the pioneer in that district?

A. Yes, sir.

Q. And when you first started, you used the cyanide process from the beginning?

A. You mean from the time we built the mill?

Q. Yes.

A. No; the party that had it in charge at that time was going to amalgamate it.

Q. That would be a different process from the cyanide? A. Altogether.

Q. Did they start in with the amalgamation process?

A. Yes, sir.

Q. And I presume they abandoned that for the cyanide? A. Yes, sir.

Q. Do you know what was the cause of changing to the cyanide process?

A. Because they could not work it by amalgamation.

Q. The ores were not suited to amalgamation?

A. No, sir.

Q. You then found that they were suited to the cyanide process? A. Yes, sir.

Q. And thereupon a cyanide plant was put in?

A. Yes, sir.

Q. And it has been used ever since?

A. Ever since.

Q. You found it was a success? A. Yes, sir.

Q. It reduced the ores properly, did it?

A. Yes, sir.

(Deposition of Gilbert S. Peyton.)

Q. And while you were there, you say that the mill went up to eighty tons per day?

A. About eighty tons per day.

Q. Started with a smaller amount, I presume?

A. Yes.

Q. And as you proceeded with your business, you gradually increased the capacity of the mill?

A. Yes, sir.

Q. Until you got it up to eighty tons?

A. Yes, sir.

Q. And did you leave that?

A. Yes, that was about the time that I left the mill.

Q. After you left, did you go on increasing the capacity of the mill? A. Yes, sir.

Q. What is its present capacity?

A. I guess about six hundred now.

Q. So it has been gradually increased from the time you commenced to use the cyanide process?

A. Yes, sir.

Q. Could you give us a rough idea as to the amount of gold that has been produced by that Mercur mill without going into detail?

A. Oh, in round numbers, I guess about three million.

Q. It has been a very successful mill then, has it?

A. Yes.

Q. Now, what was the second mill that was put up in the Mercur country, after the Mercur was put up?

(Deposition of Gilbert S. Peyton.)

A. I believe the Geyser Marion or the Geyser, it was called then.

Q. Is that running now? A. Yes, sir.

Q. What process do they use for the recovery of the gold over there? A. The cyanide.

Q. Substantially the same process that was used at the Mercur mill? A. Yes, sir.

Q. Do you know the capacity of that mill?

A. I do not.

Q. Have you any idea? A. No, I haven't.

Q. Is it a larger or a smaller mill?

A. It is smaller considerably than the Mercur mill.

Q. Do you remember the year that was started?

A. I guess that must have been about ninety-three, I take it.

Q. What was the next mill that was started in the district? A. The Sacramento, I think.

Q. Is that running still? A. Yes, sir.

Q. What process do they use at that mill?

A. The same as the others.

Q. And what was the next mill that was started?

A. The De Lamar mill.

Q. Do you remember the year that was started?

A. Well, let me see, I guess when they finished it, about ninety-six. I think it was ninety-six.

Q. What was the next mill started in that district?

A. After the De Lamar?

Q. Yes.

A. Well, the Overland was the next one,

(Deposition of Gilbert S. Peyton.)

Q. Is that the last one that has been started there?

A. That is the last one.

Q. You are connected with the Overland, are you?

A. Yes, sir.

Q. What was the capacity of that mill, when it started?

A. Started at about a hundred tons per day.

Q. It has started up now to what capacity?

A. Well, it is not running now, because we are building to five hundred, putting up to five hundred tons.

Q. You are now engaged in increasing its capacity to five hundred tons? A. Yes, sir.

Q. Is the ore about the same as that from the Mercur mine? A. It runs a little lower.

Q. I don't mean the value. I mean as regards the character.

A. The character, it is about the same.

Q. Is the character of all these ores in that district the same? A. Oxides are about the same.

Q. What do you call that ore? A. Oxides.

Q. Do you use this same cyanide process in the Overland mill? A. Yes, sir.

Q. Just the same as you had used out in the Mercur?

A. Yes, sir.

Q. You took advantage of the experience you had had with the process in the Mercur mill and applied it in the Overland? A. Yes, sir, that is the idea.

Q. Now, you spoke of using zinc shavings? Can you give us some idea, so the Court can understand as to the

(Deposition of Gilbert S. Peyton.)

nature of these shavings, as to their size and dimensions, and the diameter and so on?

A. We take a sheet of zinc and wind it on a mandrel, and then we cut it about as fine as we can with tools we have for that purpose, put it on a lathe.

Q. That is you wind the sheet of zinc around a wooden drum or roller and put that in a lathe, and as it turns, you cut that zinc with a tool? A. Yes, sir.

Q. And that is done at the mill?

A. Yes, sir, right at the mill.

Q. So you manufacture these zinc shavings?

A. Yes, sir.

Q. Where do you procure your zinc sheets?

A. Here in the city generally.

Q. They are on the market, as a commercial article?

A. Yes, sir.

Q. And you buy them yourselves and cut them yourselves? A. Yes, sir.

Q. How do you figure the cost of the zinc shavings when you manufacture them in that way?

A. The cost, figuring the zinc as it costs in the sheet, and we make a rough estimate on the other. I don't suppose we know exactly what it costs us.

Q. Of course, you know what the zinc costs you?

A. Yes, sir.

Q. And then after that, the additional cost consists in the labor of the men in operating the lathe?

A. In operating the lathe and keeping the tools in order.

(Deposition of Gilbert S. Peyton.)

Q. You have one man to do that? A. Yes, sir.

Q. Is he engaged at that all the time?

A. No, sir.

Q. He does other work besides? A. Yes, sir.

Q. What is the salary of a man of that character?

A. We generally pay our men three dollars per day.

Q. And he does other work besides that?

A. Yes, looks after the solution.

Q. You mean the solution in the zinc boxes?

A. Yes, sir.

Q. So a part of the time he is engaged in cutting these shavings and a part of the time he is attending to the solution? A. Yes, sir.

Q. Now, in order to arrive at the cost of producing these shavings you say it would be somewhat of a guess, that part of it? A. Yes.

Q. Can you tell, or would you be able to tell, what the zinc costs you laid down at the mill?

A. Now, it costs us from nine and a half cents to ten cents.

Q. Per pound? A. Yes, sir.

Q. And so whatever additional cost there would be to produce the shavings would be the labor of this man and the keeping of the tools.

A. The tools and machinery.

Q. What are the dimensions of these shavings after they are made?

A. I don't know the precise size. I know we get

(Deposition of Gilbert S. Peyton.)

them very fine. I don't know what thousandth part of an inch it would be.

Q. They have the experience somewhat of excelsior?

A. Something like that.

Q. Do you get them as thin as you can?

A. As thin as we can get them down.

Q. What is the object of cutting them so fine?

A. We have a greater precipitating surface.

Q. More surface did you say? A. Yes, sir.

Q. Did you ever use zinc prior to this in a more massive form than the shavings? A. No, sir.

Q. You started in with the shavings?

A. Yes, sir.

Q. Hadn't zinc been used in a more massive form before that? A. Never to my knowledge.

Q. You are not acquainted with that? A. No.

Q. What did you say would be your estimate of the cost of these zinc shavings to you when manufactured in this way?

A. From twelve to twelve and a half cents.

Q. You did purchase these shavings before you manufactured them? A. Yes, sir.

Q. Were they for sale on the market?

A. No, sir.

Q. Where did you purchase them?

A. We had to get them at some foundry. Somewhere, where they had a lathe and cut them for us.

Q. You had to get them cut specially?

A. Yes, sir.

(Deposition of Gilbert S. Peyton.)

Q. And they cost you at that time, you say, about twenty-five cents per pound?

A. Our first cost was as high as fifty cents.

Q. It was somewhat experimental at that time.

A. Yes, sir, and we finally pulled them down to twenty-five cents.

Q. And you found out that you could manufacture them cheaper and that was the progress of it?

A. Yes, sir.

Q. And you are now manufacturing them yourself, as you have stated? A. Yes, sir.

Q. You spoke of desiring to get the greatest surface possible of this zinc. What is your idea as to the theory of the matter in regard to that?

A. Well, the theory is, of course, the finer you can these shavings, the greater the surface you would get for the same amount of zinc, and you could bring it down smaller and get the product richer.

Q. So the finer you could get that zinc, the more surface you could get, the better it would be for your purpose? A. Yes, sir.

Q. Had you read any literature about the use of zinc prior to the time that you commenced to experiment with it there?

A. Started out, you mean, when I first started?

Q. Yes. A. I had not.

Q. When you did start out what did you read on the subject, or consult on the subject?

A. I consulted a circular.

(Deposition of Gilbert S. Peyton.)

Q. What circular?

A. MacArthur-Forrest people.

Q. And that gave you an idea as to the use of the process, did it?

A. Yes, sir, it gave me an idea it would be a good thing to try.

Q. What I meant is, whether you went and examined a lot of books and papers and periodicals and such things like that? A. I had not, sir.

Q. You just simply saw this description and you concluded it was a good thing to experiment with and you did experiment with it.

A. I pulled right out to headquarters and experimented with it.

Q. I believe your company made some kind of an arrangement with the MacArthur-Forest people for the use of that process.

A. That was after that time.

Mr. ELLIS.—Do you know they did at all?

A. I didn't say that. I always supposed they did. I believe the records of the court show some kind of a settlement was made. A settlement was made anyhow.

Mr. ELLIS.—I move to strike out the answers of the witness touching the adjustment of any claims by the MacArthur-Forest people against the Mercur Gold Mining Company.

Q. Now, did I understand you to give the amount of zinc that was consumed in this process per ton of ore that was treated? How much did you say that was?

(Deposition of Gilbert S. Peyton.)

A. Well, it varies from one-fourth of a pound to half.

Q. What causes the variation, the character of the ore? A. I should judge so; yes, sir.

Q. Do you mean that that much zinc is lost in treating that much ore? A. I do.

Q. You spoke also of a series of boxes in which this precipitating process was carried on and you gave the dimensions of those boxes. In a hundred ton plant, how much space would those boxes take up?

A. Well, it would be about—in the one which we have seven of these boxes in width, eighteen inches wide, it would be seven times eighteen, and that would take care of anywhere from seventy-five to one hundred tons.

Q. Now, how many men would you have for that?

Mr. SAFFORD.—Was there one or more of these strings?

A. Only one, as I say. That would be usual in the treatment of about a hundred tons that that row of boxes would take care of. Of course, we might put in a second. There is no limit in the number of boxes.

Q. About how many men are required to attend to a plant of that size so far as the precipitation boxes are concerned?

A. As regards the boxes?

Q. Yes. A. Well, it requires one man, is all.

Q. At the Mercur mill as it is now, with a capacity of six hundred tons per day, how many attendants does it require to attend to the precipitation boxes?

(Deposition of Gilbert S. Peyton.)

A. I don't know what they require, but I would not have but the same one. I don't know what they require, what they do.

Q. Then your judgment, as an experienced man in this matter, is that one man would be sufficient for the purpose. A. Yes, sir.

Q. Would the same be true if the capacity of the mill was seven hundred fifty tons per day?

A. Yes, sir, the running of the boxes would do.

Q. In fact it is a very small part of the process to attend to these precipitation boxes, is it not?

A. Of course, on the days of cleaning up we have to put on an extra man.

Q. I am not referring to the clean-up, just to the running. Only one man. That is a very simple operation, is it not? A. Yes, sir.

Q. And one man you think would be sufficient for that purpose? A. Yes, sir.

Q. Are these boxes particularly costly to manufacture? A. No, sir.

Q. Nothing but wooden tanks?

A. Nothing but galvanized iron, I use.

Q. And they are not a very great cost, are they?

A. No, not expensive at all.

Q. Do they wear out soon? A. No, sir.

Q. They are long-lived? A. Long-lived.

Q. Did you ever wear out a set while you were at any one mill? A. I have not.

Q. Have you ever seen or are you in any way familiar

(Deposition of Gilbert S. Peyton.)

with this process that Captain De Lamar uses, where he varies from your process, where he uses zinc dust instead of zinc shavings? A. I do not.

Q. Did you ever see it in operation anywhere?

A. Never did.

Q. Never examined it in any mill. A. No, sir.

Q. You would not know then the comparative cost between the two methods? A. I would not.

Q. Well, the figures that you have given here, those concerning the cost of saving these metals by your process, show that the cost is very low. Now, I presume that cost was more when you first started, and it has been gradually brought down to the present basis by continuous use and experiment.

A. You have reference to the precipitating boxes now?

Q. Yes, to the precipitating boxes alone.

A. Well, there has not been so very great change in that particular from what we first started, except in the cost of producing the zinc shavings ourselves or somebody else doing it.

Q. Can you tell me what those boxes cost, about what?

A. No, I don't remember now what they cost.

Q. They are not very expensive are they?

A. Oh, no; nothing but an iron box.

Q. After you take the product from these boxes, do you then refine the bullion or do you sell it in that shape?

A. Sell it.

(Deposition of Gilbert S. Peyton.)

Q. Presume it is assayed and you sell it by the assay value? A. Yes, sir.

Q. You have never refined it at your mill?

A. No, sir.

Q. I believe you did give the figures at which you sold it? A. Yes, sir.

GILL. S. PEYTON.

Witness excused.

As to the testimony of H. A. Cohn, Joseph Smith, and J. Trimmer, hearing is continued to Boise City, Idaho, on the 18th of May, 1900, at ten o'clock A. M., before Commissioner Richardson.

United States of America,
District and State of Utah, } ss.
City and County of Salt Lake.

I, John W. Christy, a Commissioner appointed by an order of Court, and as deputy clerk of the United States Circuit and District Courts for the District of Utah, duly qualified and authorized to administer oaths and to take and certify depositions, do hereby certify that pursuant to an order made by the Circuit Court of the United States for the District of Idaho, Central Division, upon a stipulation filed in said court in a suit depending therein wherein Joseph R. De Lamar is complainant and The De Lamar Mining Company, Limited, is respondent, I was attended at my office, No. 205 Dooly Block, the building used as a United States courthouse for the District of

Utah in Salt Lake City, being the office of the clerk of said Court, by A. C. Ellis and A. G. Safford, solicitors and counsel for complainant, and also by J. H. Miller, solicitor and counsel for respondent, on the third and fourth days of May, A. D. 1900; that the aforementioned witnesses, V. B. Sherrod, George Moore, Duncan McVichie, F. P. Swindler, Gilbert S. Peyton, were of sound mind and lawful age, and were by me carefully examined and cautioned and duly sworn to testify the truth, the whole truth, and nothing but the truth as to the matters at issue in said suit, and that they thereupon testified as above set forth on pages numbered from two to ninety both inclusive; that said testimony and depositions were taken down in shorthand by George B. Greenwood, a skillful and competent stenographer, pursuant to a stipulation by said parties as set forth on page one hereof, and by him reduced to typewriting; that pursuant to a stipulation and agreement made by and between said parties, as set forth on page sixty-seven hereof, the said testimony was submitted to each of said witnesses by him given, respectively, after being transcribed by said stenographer, and that all of the corrections made by said witnesses respectively appear in longhand writing in said transcript, and that where any addenda has been made by any of said witnesses, it likewise appears at the close of the type written portion of his testimony in long hand writing.

I further certify that the reason for taking said depositions was and is the fact that all of said witnesses live and reside at points more than one hundred miles from the place where said suit is appointed by law to be heard and tried; that I am neither of kin, counsel, or attorney for either of the parties to said suit, nor interested in the event thereof; and that it being impracticable for me to deliver said depositions with my own hand in the court for which they were taken, I have retained the same for the purpose of being sealed up and directed with my own hand, and now transmit the same to the Court for which taken and to remain under my hand and seal until they are opened.

I further certify that my fees for taking said depositions are for 270 folios at 15c per folio of 100 words, amounting to the sum of $40.50, for which I have rendered a bill to complainant.

In witness whereof, I have hereunto affixed my name, at Salt Lake City, in the State and District of Utah, on this twenty-third day of May, 1900.

JOHN W. CHRISTY,

Commissioner and Deputy Clerk of United States Circuit and District Courts for the District of Utah.

[Endorsed]: Filed May 25th, 1900. A. L. Richardson, Clerk.

In the Circuit Court of the United States, Ninth Circuit, for the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR

vs.

THE DE LAMAR MINING COMPANY, LIMITED.

Deposition of John Lamb.

(Before Edward J. Frawley, Examiner, at Boise City, Idaho, on the 18th day of May, 1900.)

Appearances:

For the Complainant A. G. SAFFORD.

For the Defendant, R. H. JOHNSON.

John Lamb, a witness produced, sworn, cautioned, and examined on behalf of the complainant, testified as follows:

Direct Examination.

Interrogatory 1. (By Mr. SAFFORD.) What is your name, age and residence?

A. My name is John Lamb; age, 60 years; residence, De Lamar, Idaho.

2. How long have you resided at De Lamar, and what is your occupation?

A. I have resided at De Lamar since 1891; occupation, editor and publisher of the De Lamar "Nugget" during all the time I have lived there.

(Deposition of John Lamb.)

3. Are the mines of the defendant located in that vicinity? A. They are.

3. And are you somewhat familiar with the location and development? A. Yes.

4. Do you know approximately and by hearsay what has been said in the reports of that company as to the average daily output of those mines for the past year?

(Objected to by defendant's counsel on the ground that it is hearsay and is not the best evidence, and because it is not proper evidence at this stage of the case.)

A. I have only known by report and what was general conversation over there. I know nothing from any authoritative statement. I can say to that that I have received copies of the monthly reports from the London office which I have read casually. I have not charged my memory with the contents of them.

5. From the best of your recollection what did these reports say, as to the daily output of the group? Should you say it was over or under 100 tons?

By Mr. JOHNSON.—We object to going into the question of damages and the output of the mine at this time. Also same objection as to preceding interrogatory.

A. The impression has been made on my mind that the output has been in excess of 100 tons.

6. Have you been in the habit of occasionally visiting the mines and mill?

A. Occasionally I have visited the mill but have not been in the mines.

7. Up to about three or four years ago what was the

(Deposition of John Lamb.)

method of recovering of the gold and silver? State in general terms.

A. The pan-amalgamation process was used.

8. What do you know, if anything, in regard to experiments by the defendant company, with relation to changing its methods of recovering those values.

A. I know very little, except that during Captain Plummer's superintendency on several occasions there was a chemist employed and several experiments were made, the nature of them I do not know. Succeeding that, while he was still the manager, a Pelitan-Clerici plant was put in and operated for some little time nearly three months. Afterwards that was thrown out.

9. Do you remember about what time, if ever, the so-called cyanide process was installed there?

A. Well, I could not tell you quite nearly the date.

10. Was it during Captain Plummer's administration or that of Mr. Huntley.

A. During Mr. Huntley's administration.

11. After it was installed did you visit the mill for the purpose of examining the particular method employed there?

A. I visited the mill a number of times and got a general impression of the method of treating the ores.

12. Was this with a view of publishing that method in the newspaper?

A. Not particularly, but I did publish an account of the process as I understood it.

13. How was the ore first treated?

(Deposition of John Lamb.)

A. The ore was crushed with cornish rolls and dropped into leaching tanks, a cyanide solution applied; it was drawn from those tanks into a reservoir and pumped to tanks in the press-room.

14. After the cyanide solution had passed by percolation through the ores and gathered into the tanks, how was it then treated.

A. The solution was charged with zinc powder or zinc dust and from there it was forced through a press. The zinc powder being taken up in the press on canvas, the solution regenerated by more cyanide and passed on to the storage tanks.

15. When the zinc powder or zinc dust was introduced into the solution was the charged solution in a quiescent state or agitated. A. It was agitated.

16. By what means.

A. By an air blast from the bottom of the tank which kept it in commotion.

17. So far as you know, has the above-described process substantially been followed to this time?

A. So far as I know, yes.

18. Not referring to any part of the process, excepting that part which refers to the use of zinc dust in a state of agitation, give your best judgment as to the number of times, if any, you have seen that part of the process in operation at the defendant's mill, during the past year.

A. Well, probably twenty times, but not at all within the last three months.

(Deposition of John Lamb.)

19. You spoke of publishing an article, at about the time the cyanide plant was installed; did that article contain a correct description of the process so far as you know, and as you understood it to be.

A. Yes.

20. Will you have that article copied and attached to your exhibit as "Exhibit B8," May 18, 1900?

(Objected to on the part of the defendants for the reason that it is incompetent, irrelevant and immaterial.)

It is agreed by counsel that the witness may correctly copy the article and submit it to counsel for defendant, and if found correct, that same is to be attached, subject to the above objections as Plaintiff's Exhibit "B8."

21. Was that article reduced to writing by you and printed at about the time you made the examination of which you have spoken?

A. Within a very short time after.

Cross-Examination.

XQ. 22. (By Mr. JOHNSON.) Do you know anything about the cyanide process from a chemical or metallurgical standpoint?

A. I do not. I am neither a chemist, metallurgist, or millman.

XQ. 23. Is the mill open at all times to the public?

A. It is.

(Deposition of John Lamb.)

XQ. 24. Is there no attempt to keep the process that they are using a secret?

A. None that I know of.

XQ. 25. When you visited the mill, you did so simply out of curiosity or to get information for the paper?

A. Simply for that purpose.

XQ. 26. Did you study the cyanide process from a scientific standpoint at all?

A. No; I only attempted to learn the general method and use.

XQ. 27. You spoke about the use of zinc powder or zinc dust; did you suppose that consisted of fine metallic zinc?

A. I only supposed it; I did not know it. I took it for granted.

XQ. 28. You spoke about the cyanide solution passing through a press; what is this press called?

A. Just called the press.

XQ. 29. Is it after the solution is charged with the zinc dust that it passes through this press?

A. Yes.

XQ. 30. Does the solution still contain zinc when it passes through this press? A. I don't know.

XQ. 31. During the management of Captain Plummer, do you know of any chemists having been sent to De Lamar to make experiments, by Captain De Lamar the complainant.

(Question waived.)

(Deposition of John Lamb.)

Redirect Examination.

32. Do you remember the color of the powder that was introduced into the solution in a state of agitation?

A. It was dark gray.

33. Did it have a metallic luster?

A. Well, no, I think not; it was dull.

JOHN LAMB.

In the Circuit Court of the United States, Ninth Circuit, for the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR,

vs.

THE DE LAMAR MINING COMPANY, LIMITED.

Deposition of W. R. Thomas.

(Before Edward J. Frawley, Examiner, at Boise City, Idaho, on the 18th day of May, 1900.)

Appearances:

For the Complainant, A. G. SAFFORD.

For the Defendant, R. H. JOHNSON.

W. R. Thomas, a witness produced, sworn, cautioned, and examined on behalf of the complainant, testified as follows:

(Deposition of W. R. Thomas.)

Direct Examination.

Interrogatory 1. (By Mr. SAFFORD.) What is your name, age, residence, and occupation?

A. W. R. Thomas; residence, De Lamar; age, 27; occupation, assayer.

2. Are you in the employ of the defendant company?

A. I am.

3. How long have you been in that employ?

A. A little over two years.

4. Have you had any conversation, so far as you re- [illegible], with the complainant, or any of his counsel, with reference to your proposed testimony here today?

A. I have not.

5. Is the cyanide process with zinc dust precipitation used at the defendant's mill, and has it been used there during the time that you have been employed by the defendant?

(Question waived.)

6. Has a cyanide process been used at the mill of the defendant since your employment there for the purpose of extracting the value from the ores and presenting them in the form of a cyanide solution, charged with the precious metals? A. It has.

7. In the course of the manipulation of the charged cyanide solution, has zinc dust been employed in connection with the precipitation of gold values from the solution? A. It has.

8. What do you mean by zinc dust?

(Deposition of W. R. Thomas.)

A. Finely powdered zinc.

9. Does it contain no zinc oxide?

A. I don't know.

10. Did you never chemically analyze it?

A. Never analyzed it for anything but zinc.

11. Is it used as it is purchased in the market, or is it treated in any way before used in the precipitating tanks?

A. It is used exactly as it comes from the market, unless it happens to be lumpy, and then it is broken up.

12. Is it a bluish gray color?

A. I never thought of it being bluish; it is a dark gray.

13. Does it not consist of an interior particle of metallic zinc coated externally with an envelope of zinc oxide? A. I don't know.

14. Do you not know that it is a bi-product resulting from the process of the manufacture of zinc from its ores, and which is found in the prolongation of the condenser used in that process?

A. I have always understood it was a bi-product, but exactly where they obtain it I didn't know.

15. Do you not understand that in the process of obtaining zinc from its ores, that the zinc is first distilled in a retort and admitted into a condensing chamber, where it is condensed, and that on account of the accidental, or otherwise, admission of oxygen into the condensing chamber, some of the particles become coated with the oxide of zinc, and therefore the whole mass

(Deposition of W. R. Thomas.)

does not cohere; and the particles of zinc enveloped in the zinc oxide are drawn by the blast at the furnace into the prolongations of the condensers.

A. I did not. I have never seen zinc dust produced, and I have never studied the process of mixing it.

16. After the solution passes the filter presses, do you ever make assays of the solution as it passes from the presses? A. Yes, sir.

17. Is that a common and ordinary procedure in your business? A. It is.

18. And it is done for the purpose of ascertaining the effectiveness of the preceding steps in the recovery of values from the ores?

A. That is the principal reason, but there is another reason, to see how much money is collected for the day in the press.

19. Those assays, then, I understand, are for the purpose of guidance to your employers, and to determine whether the manipulation of the ores and solution has given the best results obtainable.

A. That don't affect the manipulation of the ores in general, but it affects the manipulation of the zinc dust, and the solutions, but not the ore.

20. Then, I understand that you also assay the solution as it comes from the leaching tanks to ascertain whether you are securing a thorough extraction from the ores? A. Yes.

21. The results of your assays are communicated to the superintendent of the mill or to some one for the

(Deposition of W. R. Thomas.)

purpose of guiding them, among other things, as to the amount of zinc dust to be put into the precipitating tanks, are they not?

A. No, I judge from the assay of the filtrate coming from the presses, and not from the preliminary assay coming from the ore.

22. And as I understand you, then, the assay of the filtrate is communicated by you to some other employee for the purpose of guiding that employee as to the amount of zinc dust to be put into the precipitating tank?

A. Yes.

23. There is a chemical equation, I believe, showing the theoretical amount of zinc required to precipitate a given amount of gold existing in a cyanide solution, is there not? A. I believe there is.

24. Do you recall that theoretical equation?

A. I do not.

Cross-Examination.

Interrogatory 1. (By Mr. JOHNSON.) In the works at De Lamar do you use a definite quantity of zinc dust, the quantity of said zinc dust being supplied in only a sufficient quantity to thoroughly precipitate the contained metals? A. Yes.

25. Do you use at the De Lamar mill a regular quantity of zinc dust?

(Objected to as irrelevant.)

A. No.

(Deposition of W. R. Thomas.)

26. Throughout the month does the daily amount of zinc dust used bear a regular ratio to the gold and silver contents of the solution precipitated?

(Same objection.)

A. It does not.

27. Is it not a fact that you use an excess of zinc to precipitate the precious metals?

(Same objection.)

A. I do.

28. What did you mean then by saying above that you used only the exact amount to thoroughly precipitate the metals?

(Objected to as leading and incompetent.)

A. As I remember, it is not the question that I answered "yes," to. I wish to be understood that the thorough precipitation of the gold is what regulates the quantity of zinc dust. I will illustrate. If the assays of the solution coming from the press show that the precipitation has been satisfactory, I regulate the zinc dust to be added accordingly, if the assays show that the precipitation has not taken place, I immediately increase the quantity of zinc dust used. I mean satisfactory precipitation.

29. Explain fully what you mean by the use of an excess of zinc.

(Objected to as immaterial.)

A. If a given quantity of zinc dust precipitated 50 per cent I would more than double the amount of zinc dust to try and get the other 50 per cent.

(Deposition of W. R. Thomas.)

30. Do you find that there is zinc present in the filter presses. A. Yes.

31. What is your opinion as to the value of zinc dust as a precipitant of cyanide solutions over other forms of metallic zinc?

(Objected to; the witness has not qualified as an expert. Question waived.)

32. You regularly make the assays of the solution flowing from the leaching tanks, do you not?

A. I do.

33. These are called pregnant solutions, are they not? A. They are.

34. Do these pregnant solutions vary greatly in value? A. No.

35. When you change filter presses, although the solutions continue of about the same value, or practically the same value, do the amounts of zinc dust used remain constant?

(Objected to as leading.)

A. No the quantity of zinc dust varies.

36. I suppose you refer to pregnant solution.

A. Yes.

37. Does the amount of zinc dust increase or decrease?

A. It decreases after the press has been used some time.

38. Does it increase on changing to a new press?

A. Zinc dust always increased on changing to a new press.

(Deposition of W. R. Thomas.)

39. About how much?

A. From ten to twelve pounds when starting a new press as against four or five pounds later on after the press has been running five or six days.

40. And the pregnant solutions during this time do not notably change, do they, in value?

A. They do not.

Redirect Examination.

41. (By Mr. SAFFORD.) You have spoken of solutions varying in value, do you mean by that, varying as to the quantity of gold and silver contained.

A. Yes.

42. You have spoken of changing the quantity of zinc dust to be used five or six days after a new filter press was set up, and you have said that you decreased the amount from ten or twelve pounds to five or six pounds; do you do that arbitrarily or because your experience with the plant has shown to you that by reason of the decrease you do not use a greater amount of zinc dust than the solution requires?

(Objected to as misleading.)

A. I cannot answer the question by yes or no.

43. Do you decrease the amount of zinc dust arbitrarily and without reference to the assays which you have made, and your experience at this plant?

A. Former experiences of course helped; the quantity of zinc dust is not decreased until the assays from the solution going from the press show satisfactory precipitation.

(Deposition of W. R. Thomas.)

44. Do you decrease the amount of zinc dust arbitrarily and without reason therefor, or is the decrease made because you ascertain by assay and experience that you used too much zinc dust when the filter presses were first set up, for economical precipitation after five or six days' use?

(Objected to as misleading and embracing several questions.)

A. I don't decrease the quantity of zinc dust arbitrarily.

45. Do you decrease to the amount which you predetermine to be the amount proper to thoroughly precipitate the values without a useless addition of zinc dust.

(Objected to for the same reason.)

A. There is no way to determine how much zinc dust is required before it goes into the tank. The tank is always judged by the tank that went before it.

(Answer objected to as not responsive to the question. Question repeated.)

A. That is the only answer I can give.

46. Have you ever intentionally used an excessive useless quantity of zinc dust for the precipitation of the values out of cyanide solutions? A. I don't know.

47. Did you understand the question to mean whether you had intentionally used that useless excessive quantity.

(Objected to as being incompetent, irrelevant and immaterial and misleading.)

(Deposition of W. R. Thomas.)

A. I never used an excessive quantity intentionally, there was always some reason. By excessive quantity I mean a large quantity.

48. Do you not mean any useless excessive quantity.

(Objected to as being irrelevant, incompetent and immaterial and misleading.)

A. I never intentionally added more than I thought was required.

W. R. THOMAS.

In the Circuit Court of the United States, Ninth Circuit, for the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR
vs.
THE DE LAMAR MINING COMPANY, LIMITED

Deposition of D. B. Huntley.

(Before Edward J. Frawley, Examiner, at Boise City, Idaho, on the 18th day of May, 1900.)

Appearances:

For the Complainant, A. G. SAFFORD.

For the Defendant, R. H. JOHNSON.

It is agreed by the counsel of the respective parties that the following statement made by Mr. D. B. Huntley

(Deposition of D. B. Huntley.)

shall be accepted as his testimony describing the cyanide process as operated at the defendant's mill at De Lamar, Owyhee County, Idaho:

Description of the Operations at the De Lamar Mining Company's Mill at De Lamar.

The crushed ore is leached four or five days with a cyanide solution. Then it is washed with water. No chemicals, except a little lime or lye, are added to the ore. The leaching is continuous. The cyanide solution from the leaching tanks, containing about $4.00 per ton of solution, flows through launders and pipes to sump tanks on the lower floor of the mill. From these sump tanks the solution is pumped up to the upper part of the mill into precipitating tanks of which there are three. They are about 8 feet by 12 feet. When one precipitating tank is full the stream is turned into another. Each precipitating tank holds about 17 tons of solution. There is in the bottom of each precipitating tank a set of iron pipes in which are bored small holes, and these pipes connect with a small air compressor. When a precipitating tank is full of solution, the air compressor is started, and, as a result, bubbles of air rise through the solution, producing a boiling and agitation of the liquid. Then immediately, from 4 to 12 pounds of zinc dust for each tank of solution is sprinkled upon the surface of the liquid. It is sprinkled by hand from a small scoop, during about one minute. The air compressor continues in operation for about 15 minutes, when it is stopped. By this action some, but not all, of the gold in the solution

(Deposition of D. B. Huntley.)

is precipitated. The solution still contains some unprecipitated gold. Also a portion of undissolved zinc dust remains in suspension. A pump is then started which pumps and forces the liquid containing the gold precipitate and the undissolved zinc dust through a filter press. In this filter press some more of the gold is precipitated by passing through the layer, on the cloths of precipitates which contain an excess of zinc dust, and all the sediment remains in the chambers of the press, while the clear liquid is pressed through the cloths, and runs out through appropriate openings, and then into storage tanks above the leaching vats, where it is collected and used over again; the same solution being repeatedly used and never thrown away. More cyanide is added after passing through the filter press to bring the solution up to the required strength. The clear solution, after passing through the filter press, contains only from ten to thirty cents per ton. About every two weeks the filter presses are opened and the collected sediment of zinc dust and precipitated precious metals are taken out of the chambers, the filter press cloths renewed, and the press started up again for a new charge. The mixture of zinc dust and the precipitated gold and silver, together with the ash of the filter cloths (which are burned), is refined or shipped to some refinery for treatment.

It has been noted at these works, since their beginning, that sometimes the regular weight of the zinc

(Deposition of D. B. Huntley.)

dust, when added in the precipitating tanks, does not seem to precipitate the usual proportion of the gold and silver. In such cases the clear solution, running from the filter press, will assay up to perhaps $2.00 per ton, until an extra amount of zinc dust is used for a few days, sometimes as high as 12 pounds per tank then the assay value drops down to the regular 10 to 30 cents per ton. In our laboratory tests (by shaking in a bottle) we have found it impossible to use as small an amount, proportionally, of zinc dust as we do in general mill practice, and get as close precipitation. We have always had to use a larger proportion of zinc dust in such cases, and the results of such laboratory precipitations have been irregular and unreliable.

The precipitation of the metals evidently does not take place entirely in the precipitating tanks, but the last portion of it takes place in the filter press. When new cloths are used (as in starting up the filter press), it is always found that the precious metals are only partially precipitated by the usual amount of zinc dust. And it always is the rule, in starting up a new press, to use from ten to twelve pounds of zinc dust, per tank, for a day or so, until the solution flowing from the press gives low assays. We have found out by experience at our works the following facts:

(1) That a complete precipitation of all the metals in the solution is not effected in the precipitating tanks, but only a partial precipitation is there effected.

(Deposition of D. B. Huntley.)

(2) That the remainder of the precipitation is effected in the filter press where pressure is employed.

(3) That a complete precipitation of all the metals in the solution is not effected either in the tanks or filter press, because the clear solution coming from the filter press contains from 10 to 30 cents per ton.

(4) That we cannot and do not determine beforehand the exact quantity of zinc dust necessary to precipitate the metals in the solution; nor do we use said exact or definite quantity, but always use, or intend to use, an excess of zinc dust.

D. B. HUNTLEY.

DE LAMAR CYANIDE PLANT.

The Filtering Press at Work.

Fourteen More Leaching Tanks to be Put in Without Delay.

(From the De Lamar "Nugget," March 4, 1898.)

The big filter press was set up at the De Lamar mill last week, and is now in successful operation. As this press is a recent introduction to the cyanide process, a description of it and of the process in use here may be of interest to our readers. To begin with, briefly the cyanide process is a method of dissolving the gold and silver contained in the ore with a solution of cyanide of potassium and leaching out the solution, and precipitating the values therefrom. The process is apparently a simple one. The ore is filled into large vats, and the

(Deposition of D. B. Huntley.)

solution filtered through it until it has carried with it practically all the values it contained; then, by the process most in vogue, known as the MacArthur-Forrest process, which is controlled by patents, the solution is filtered through zinc shavings, and the gold and silver having a greater affinity for the zinc is caught from the solution and recovered. This method of treating ores has been in use for several years, and with many classes of ores has been cheaper and successful in saving a higher percentage of values than the former milling processes employed. But only a small proportion of the mines have ores which can be completely dissolved by cyanide, and there are so many conditions to be considered that mine owners should not undertake to adopt its use without a thorough investigation by a competent metallurgist and chemist. Even as recently as two years ago it would not have been practicable to have treated De Lamar ores by this process, as developed up to that time. Captain Plummer, then manager, after exhaustive tests and experiments made by noted experts, had to abandon the idea of adopting it. The famous Mercur mines in Utah expended large sums and ran greatly behind in trying to employ the process before a fortunate discovery made by one of the owners, who was not a metallurgist or expert, led to the phenomenal success the company is now achieving. That discovery made the process practicable here. It was simply in having learned that it was not necessary to crush the ore so fine before leaching that the pulp would slime so that

(Deposition of D. B. Huntley.)

it could not be successfully leached. By filling a leaching tank with ore crushed to the size of marbles, it was found to leach properly, and that the solution practically carried with it all the bullion. On the other hand, it was found at the great De Lamar, Nevada, mines, where the ore is very hard, flinty quartz, the best results were obtained by grinding as fine as 60 mesh.

At the mill here the ore, much of it comes out of the mine quite fine, is run over a grizzly, and the coarse rock run through a closely set rock breaker, and goes from the ore bin direct to the vats.

But enough for the introduction. We started to give a description of the plant and process as employed here.

Beginning from the upper part of the mill, the plant consists of two solution tanks, the hydraulic press, several tanks for the storage of solution, then the leaching tanks, and below them all a tank into which the solution runs after leaching through the ore, a force pump to force the solution back, charged with the dissolved bullion, to the first tanks mentioned. An air compressor, with pipes running to the bottom of these two tanks, keeps the solution constantly agitated, and, as they are being filled, finely powdered zinc is thrown into them, which catches the values in the solution. When one tank is full, and, while the other is filling the full tank is pumped through the filter press where the zinc powder holding the gold and silver is filtered out and held, while the solution running off is tested and cyanide added to

(Deposition of D. B. Huntley.)

bring it up to its proper strength again, and run into the storage tanks, from whence it is drawn as required into the leaching tanks to go the same round once more.

At present there are ten leaching tanks employed, each holding a little more than thirty tons, and two of them are emptied and discharged every day; the leaching process thereby being carried on for four days on all the ore and sixty to sixty-five tons being run through the plant every twenty-four hours.

Fourteen more leaching tanks will be put in soon, which will bring the capacity of the plant, including the electric plant, up to more than 200 tons per day.

The filtering press is the most interesting feature of the plant. It is an oblong box about eighteen feet in length by two feet six inches outside measurement. This box is built up of six inch wide transverse sections, between each two of which is a cast-iron plate, fluted and guttered to drain into one lower corner where a spigot hole is left in the casting. As the box is put together, a piece of heavy duck canvas is stretched on each side of the fluted plates, and the whole is tightly clamped together, each piece being hung on lateral rails by projecting lugs. A hole is left in one upper corner of each section and plate, and the canvas cut out at this point, so that when all is clamped together the holes in the sections form a pipe the full length of the press. A pump forces the solution from the tank through this hole into each section of the press and canvas from which it is drained out through the canvas, fluted plates and

(Deposition of D. B. Huntley.)

spigots into a trough conveying it to the storage tanks, the zinc powder and gold and silver being caught and held by the canvas.

The press is taken apart, and a clean-up made as often as thought necessary or convenient. With the present capacity of the plant, this clean-up will be made once a month. The wet and dirty looking paste taken out at a clean-up is dried in a steam pan, sacked and shipped to a refinery where the zinc is melted out and the bullion cast into bars to be sold.

The advantage over other processes claimed for this ore are:

First, the saving of power, which at the cost of fuel here was an enormous expense.

Second, the cost of handling the ore through the mill, reduced to twenty-five per cent of the amount formerly paid for labor.

Third, the greatly reduced cost of machinery and repairs.

Fourth, the reduced cost of the chemicals and other materials used, quicksilver, salt and bluestone being abandoned and zinc powder and cyanide of potassium being employed, and

Finally, a considerably higher percentage of values saved.

The last item cannot, however, be definitely fixed or closely estimated until one or more clean-ups have been made.

(Deposition of D. B. Huntley.)

It can now be confidently asserted that the cyanide process has come to stay in De Lamar, but there are so many matters to be considered in connection with the process that its adaptation to other ores in Owyhee or elsewhere can only be determined by careful investigation and experiments made by accomplished metallurgists; and it will not do for mine owners to jump at conclusions that their ores are adapted to the process.

De Lamar, Idaho, May 21, 1900.

I hereby certify that the foregoing is a true copy of an article describing the cyanide process, written by me, and published in the De Lamar "Nugget" in the issue of March 4, 1898.

JOHN LAMB.

In the Circuit Court of the United States, in and for the Central Division of the District of Idaho.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.

Report of Examiner.

District of Idaho—ss.

I, E. J. Frawley, hereby certify that the foregoing testimony in the above-entitled cause was taken before me at the times and places in record thereof indicated; that before testifying each of the several witnesses was by me severally and duly sworn to tell the truth, the whole truth and nothing but the truth; that said testimony was taken down by a typewriter, and the testimony as taken down and extended was thereafter read over, corrected and signed by said witnesses in my presence respectively.

That complainant duly introduced in evidence in said cause exhibits marked from "B 1" to "B 8," inclusive.

All of said exhibits on the part of complainant being duly filed in evidence in said cause.

Dated at Boise City, Idaho, June 18, 1900.

E. J. FRAWLEY,

Examiner.

[Endorsed]: No. 177. United States Circuit Court, Central Division, District of Idaho. Jos. R. De Lamar vs. The De Lamar Mining Company, Limited. Report of Examiner Frawley. Filed June 21, 1900. A. L. Richardson, Clerk.

In the Circuit Court of the United States for the District of Idaho.

Commission for Taking Testimony of W. J. Sharwood.

The President of the United States of America, to George W. Padbury, Notary Public in and for Lewis and Clarke County, Montana, Greeting:

Know ye, that we in confidence of your prudence and fidelity, have appointed you a Commissioner, and by these presents do give you full power and authority diligently to examine W. J. Sharwood, each, upon his corporal oath or affirmation, before you to be taken, and upon the interrogatories and cross-interrogatories hereto annexed, as a witness on the part of the respondent in a certain cause now pending undetermined in the Circuit Court of the United States of America, for the District of Idaho, wherein Joseph R. De Lamar is plaintiff and The De Lamar Mining Company is defendant; and we do hereby require you before whom such testimony may be taken to reduce the same to writing, and to close it up under your hand and seal, and direct it to the clerk of the above-entitled Court, at Boise City, in the District of Idaho, as soon as may be after the execution of this commission; and that you return the same, when executed as above directed, with the title of the cause endorsed on the envelope of the commissioner.

Witness, the Honorable MELVILLE W. FULLER, Chief Justice of the Supreme Court of the United States, at Boise City, in said District, this the 28th day of September, A. D. 1900.

[Seal] A. L. RICHARDSON,

Clerk.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR, Complainant, vs. THE DE LAMAR MINING COMPANY, LIMITED, Respondent.	No. 177.

Stipulation as to Issuance of Commission for Taking Testimony of W. J. Sharwood and Order.

It is hereby stipulated in the above-entitled cause, as follows:

That a commission issue out of the above-entitled Court to George W. Padbury, a notary public in and for Lewis and Clarke County, State of Montana, to take the testimony of W. J. Sharwood, of Marysville in said county upon the direct and cross-interrogatories hereto attached:

That the solicitors for respondent shall, upon the return of the interrogatories and cross-interrogatories to them, proceed at once and without any unnecessary delay to procure said commission and cause said testimony to be taken upon said interrogatories and cross-interrogatories and returned by said Commissioner to the clerk of said Court; and said testimony may be used upon the trial of said cause, subject to all legal objections, although the same may not be taken and filed prior or on the first day of October next, provided the same be taken and filed on or before the fifth (5th) day of October, 1900.

Dated this 24th day of September, 1900.

DICKSON, ELLIS & ELLIS,
Solicitors for Complainant.
JOHN H. MILLER, and
JOHNSON & JOHNSON,
Solicitors for Respondent.

Order.

Let a commission issue in the foregoing entitled cause, in accordance with the foregoing stipulation, to George W. Padbury, a notary public in and for Lewis and Clarke county, State of Montana, to take the testimony of W. J. Sharwood, a witness on behalf of respondent, at Marysville in said county, upon the direct and cross-interrogatories hereto attached.

Boise, September 28, 1900.

JAS. H. BEATTY,
Judge.

In the Circuit Court of the United States for the District of Idaho.

IN EQUITY.

JOSEPH R. DE LAMAR,
Complainant,

vs.

THE DE LAMAR MINING COMPANY, LIMITED,
Defendant.

No. 177.

Direct Interrogatories to be Propounded to W. J. Sharwood Under the Annexed Commission.

Interrogatory One: State your name, age, residence and occupation.

Interrogatory Two: State when and where you graduated, with what degree, and what experience you have had in the study of chemistry and chemical researches.

Interrogatory Three: State in detail what experience you have had in mining matters and the practical treatment of ores, and in matters relating to the chemistry of mining and reducing ores and precipitating the precious metals from solutions in which they may be contained.

Interrogatory Four: Are you familiar with the MacArthur-Forrest process for precipitating the precious metals from cyanide solutions, and if so how long have you been acquainted with the same?

Interrogatory Five: In that process describe how the precious metals are precipitated from the cyanide solution and what is the chemistry of the process according to the generally accepted theory of chemists.

Interrogatory Six: Can you explain why in said MacArthur-Forrest process zinc shavings, commonly called filiform zinc, are used?

Interrogatory Seven: Can you state whether it is more advantageous to use zinc shavings in said process than to use zinc in a more solid form, such as plates or bars, and if so, wherein lies the advantage?

Interrogatory Eight: Please describe the process in use at the Montana Mining Company's cyanide plant for precipitating the precious metals from cyanide solutions, and state what business relation you bear towards the same, and what are your duties in regard thereto.

Interrogatory Nine: Have you read and do you understand the Waldstein patent sued on in this case?

Interrogatory Ten: Wherein does the process described in said Waldstein patent, differ from the process as practiced at the Montana Mining Company's cyanide plant?

Interrogatory Eleven: If this Waldstein patent were presented to you as an expert in the art for the first time, you never having seen or heard of it before, and you were told to carry out the process described in that patent, how would you proceed to carry out the same, and what difficulties, if any would you meet with?

Interrogatory Twelve: In view of what you have said, state whether or not, in your judgment as an expert in this line of business, it would be possible to carry out successfully in practice the process described in the Waldstein patent according to the strict letter of the patent, and you may give your reasons in detail for the answer you make to this interrogatory.

Interrogatory Thirteen: Is zinc oxide a precipitant of precious metals from cyanide solutions?

Interrogatory Fourteen: Is zinc oxide soluble in cyanide solutions, and if so, with what degree of rapidity is it soluble?

Interrogatory Fifteen: Assuming that zinc dust is a mixture of metallic zinc and zinc oxide, as the witnesses for complainant have testified, state what would be the effect, either one way or the other, of the zinc oxide in hastening the precipitation of precious metals in a cyanide solution.

Interrogatory Sixteen: State whether or not, in your judgment, the zinc oxide contained in zinc dust has any beneficial effect in the operation of precipitating the precious metals from cyanide solutions, and give your reason in full.

Interrogatory Seventeen: Is it possible to dissolve the zinc oxide contained in zinc dust, and if so by what chemicals?

Interrogatory Eighteen: When the oxide has been washed off or dissolved fom the zinc particles in zinc dust, what is left, and how will this residue that is left act in precipitating the precious metals from cyanide solutions as compared with the action of zinc dust containing zinc oxide?

Interrogatory Nineteen: Is metallic gold soluble in a cyanide solution?

Interrogatory Twenty: According to the Waldstein patent just enough zinc dust must be used to precipitate the gold in the cyanide solution, so that after the gold is precipitated there will be no excess of zinc dust; now, if it were possible to carry out that process and use just enough zinc dust to precipitate the gold in the solution so that no excess of zinc dust would be left, what would happen to the gold that had been precipitated, and what effect would that have on the process as a practical process for precipitating gold from cyanide solutions?

Interrogatory Twenty-one: In view of the testimony you have given, state whether or not in your judgment it is necessary to use an excess of zinc dust when using zinc dust as a precipitant for gold from cyanide solutions, and give your reasons in detail for such opinion as you may express.

Interrogatory Twenty-two: How long has zinc dust been known to chemists as a convenient and effective form in which to use the metal for purposes of reduction?

Interrogatory Twenty-three: For how long a time has zinc dust been mentioned by chemists as a known precipitant for gold from cyanide solutions?

Interrogatory Twenty-four: What is the object of agitation when using zinc dust for precipitating gold from a cyanide solution?

Interrogatory Twenty-five: For how long a period has it been known to chemists that agitation was an efficient method for bringing two substances into close contact when in solution, and in this connection you may mention instances where agitation has been used for such purposes in a chemical process.

Interrogatory Twenty-six: Some of the witnesses for complainant have expressed the opinion that when zinc dust is used in a state of agitation for precipitating gold from cyanide solutions, a voltaic or electric couple is formed between the metallic zinc and zinc oxide, which hastens precipitation. Now, assuming for the time being that such a couple is formed, state what in your opinion would be the degree of electro-motive force evolved and whether or not in your opinion it exerts any beneficial effect in aiding or hastening the precipitation of the gold; and give your reasons in full for such opinion as you may express.

Interrogatory Twenty-seven: Assuming that there is such a couple formed, you may state whether or not there is any other circumstance or influence at work during the precipitating process which would tend in any way to counteract or lesson in value such possible electro motive force as might be generated by such couple.

Interrogatory Twenty-eight: If such a couple is formed, what, in your opinion, would be the comparative value of such a couple and the increased surface of the zinc exposed when the zinc oxide is dissolved from the zinc dust?

Interrogatory Twenty-nine: Have you read the account of certain experiments made by Professor Cabell Whitehead with zinc dust and mechanically divided zinc, which account appears in an affidavit by Professor Whitehead in the file wrapper contents of the Waldstein patent, and if so what criticism have you to make concerning the said experiment?

Interrogatory Thirty: State whether or not you have made any experiments along the same lines as those of Professor Whitehead with a view to ascertaining whether ordinary metallic zinc reduced to a state of fine division is equal or superior to zinc dust as a precipitant for gold from cyanide solutions.

Interrogatory Thirty-one: If you have made such experiments please state when and where and under what circumstances they were made, and describe the said experiments in minute detail in every particular, and give the results reached by you and demonstrated by said experiments.

Interrogatory Thirty-two: If you know of any matter or thing relevant and material to the subject matter of this controversy not covered by the above interrogatories, please state the same.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR, Complainant, vs. THE DE LAMAR MINING COMPANY, LIMITED, Respondent.	No. 177.

Cross-Interrogatories to Be Propounded to W. J. Sharwood.

Cross-Interrogatory 1: If you answer interrogatory four in chief that you are familiar with the McArthur-Forrest Process for precipitating the precious metals from cyanide solutions, state when and where you first so became familiar with that process, and the different reduction works at which you observed it and state whether that process was used by you personally or under your direct personal supervision.

Cross-Interrogatory 2: If you answer Interrogatory four in the affirmative as to being familiar with the McArthur-Forrest process, state the character of the ores as to metallics and mineral contents and the character of the gangue and associated rocks carrying the metals.

Cross-Interrogatory 3: State your experience and personal knowledge touching the percentage of the recoveries of the precious metals from their ores by the use of the McArthur-Forrest process at the different places where you have known it to be used.

Cross-Interrogatory 4: State your knowledge of the amount or percentage of zinc consumed or lost in the recovery of the precious metals from solution of cyanide of potassium by the McArthur-Forrest process, and in answering this question state how and to what extent, if any, the presence of other metals in the ores from which such solutions were obtained, affected the loss of zinc.

Cross-Interrogatory 5: State approximately the amount or percentage of loss of zinc in the use of the McArthur-Forrest process for the recovery of the precious metals from the cyanide solution obtained from free milling ores, or ores carrying no base metals.

Cross-Interrogatory 6: State the percentage of loss of cyanide of potassium according to your knowledge and experience in the use of the McArthur-Forrest process for the recovery of the precious metals from their cyanide solutions obtained from such free milling ores.

Cross-Interrogatory 7: Is the loss of both zinc and cyanide of potassium or either increased by the presence of base metals in a solution of cyanide of potassium carrying the precious metals where the precious metals are recovered from such solution by the McArthur-Forrest process?

Cross-Interrogatory 8: If in answer to interrogatory eight in chief you state that you used zinc dust as the same is described and claimed in the Waldstein Patent in the process you use at the Montana Mining Company's cyanide plant, please state whether you add any substance or chemical to the zinc dust used in the precipitating tank to facilitate the precipitation of the precious metals from the solution of cyanide of potassium.

Cross-Interrogatory 9: If you use any additional chemical with said zinc dust for the purpose named, state what it is and in what manner and quantity used, and why you use it, and what the affect is in the matter of the chemistry of the operation.

Cross-Interrogatory 10: When did you commence the use of such chemical, and why did you commence it and when, if at all, did you abandon the use of such chemical and why did you abandon it?

Cross-Interrogatory 11: When did you first ascertain that the zinc dust described in the Waldstein Patent was used upon a commercial or large scale in the recovery of precious metals from a solution of cyanide of potassium obtained in the reduction of the ores of gold and silver?

Cross-Interrogatory 12: Did you have any knowledge of the use of said zinc dust in aqueous cyanide solution in the state of agitation for the precipitation of the precious metals on a large or commercial scale before March 9, 1896; and if you had, state the name and place of the reduction works and the name of the mine from which the ores so reduced were taken?

Cross-Interrogatory 13: Before you commenced the use of the zinc dust described in the Waldstein Patent in solutions of cyanide in a state of agitation at the Montana Mining Company's cyanide plant, if you have ever so commenced, did you investigate the use of such zinc dust as a precipitant of precious metals at any ore reduction plants, and if you did, where were these reduction works situated and what man or company operated them?

Cross-Interrogatory 14: State whether or not, according to your knowledge or information, some other substance was not added to the zinc dust in question when put into the solution of cyanide of potassium at the Montana Mining Company's cyanide plant for the purpose of circumventing the employment by that company of the process described in the Waldstein Patent.

Cross-Interrogatory 15: State, if you know, or if you have any information from the owners of the Montana Mining Company's cyanide plant, whether or not the owners of that plant have purchased the right from or agreed to pay royalty to the owners of the Waldstein Patent for the use of the process therein described.

Cross-Interrogatory 16: If in answering interrogatories eleven and twelve you state that it would not be possible to carry out successfully in practice the process described in the Waldstein Patent according to the letter of the patent, for the reason that if the exact amount of the zinc dust described in that patent were used for the purpose of precipitating the precious metals and no more, the precipitated metals would be redissolved and thus no precipitate obtained, state whether you would consider that the precious metals contained in such solution would be thoroughly precipitated by the use of such zinc dust within the scope of the second claim set forth in said patent.

Cross-Interrogatory 17: Would you consider any metal thoroughly precipitated by the use of any precipitating reagent where, after the theoretical precipitation had taken place upon the substitution of the precipitating reagent in lieu of the metal or substance sought to be precipitated, the precipitate would be immediately redissolved by the menstruum used?

Cross-Interrogatory 18: Is it not true that in the practical precipitation of metallic or other substances from their solutions, the chemist or metallurgist always employs a slight excess of the precipitating reagent in order to throw down that substance or metal and keep it down so that it may be recovered?

Cross-Interrogatory 19: If in ascertaining the quantity of a precipitant that would be necessary to throw down all of the metallic contents of a given volume of solution to ascertain that amount by the chemical equation or atomic weights, would not the chemist or metallurgist add, especially in the case of an aqueous cyanide solution containing gold and silver, a slight excess to be determined both by the equation and by experiment in order to throw down the gold or silver and keep it down that it might not be recovered?

Cross-Interrogatory 20: In reading the Waldstein Patent, would you not in putting the process therein described into practical use, ascertain the actual theoretical amount of zinc dust to be added and then add a slight excess to that in order to throw down the gold or silver and keep it down?

Cross-Interrogatory 21: Would not the amount so ascertained by the chemical equation and the experiment in practice be a definite or exact amount, or at least as nearly so as it is possible in practicing the art of extraction of precious metals from their solution of cyanide of potassium by the process described in the Waldstein Patent?

Cross-Interrogatory 22: Do you not in practice at the Montana Mining Company's plant put in practically a definite amount of zinc dust in your precipitating tank containing an ascertained amount of volume of solution?

Cross-Interrogatory 23: Do you not put in as small an amount of zinc dust as your assays and your experience have determined will be sufficient, for the reason that the smaller quantity of the zinc dust so used is less expensive and the precipitate produced is of a higher grade than if you use a very large and undetermined quantity of zinc dust?

Cross-Interrogatory 24: Do you not know that such is the practice at all of the works using the Waldstein process with which you are acquainted?

Cross-Interrogatory 25: Do you run the Montana Mining Company's works upon ores or tailings?

Cross-Interrogatory 26: Are you not advised of the amount of gold and silver contained in that ore or tailings before you obtain the cyanide solution for precipitation after percolating through these ores?

Cross-Interrogatory 27: Do you not make it a point to be advised of the contents of your solution carrying the precious metals after it has passed through the percolating tanks and has been pumped into the precipitating tanks?

Cross-Interrogatory 28: If you do, how do you ascertain that fact?

Cross-Interrogatory 29: Do you not add a sufficient amount of zinc dust to the solution in agitation to thoroughly precipitate the contained metals and no more?

Cross-Interrogatory 30: In the light of that general knowledge which is possessed by a chemist and metallurgist touching this general law of precipitation, would he not understand the patent, in practicing the art described in the Waldstein Patent, to mean that he must use that definite quantity of zinc dust which would mean an excess which is necessary to throw down and keep down the precious metals?

Cross-Interrogatory 31: If you answer that zinc oxide is not a precipitant of the precious metals from cyanide solution, state why you make such answer and what, if any, experiments you have personally made to determine such answer?

Cross-Interrogatory 32: Is not both zinc and zinc oxide soluble in a cyanide solution?

Cross-Interrogatory 33: Does the question of whether a given substance will operate as a precipitant of another substance contained in a solution depend upon whether or not the precipitant is soluble or insoluble in that solution?

Cross-Interrogatory 34: State whether or not zinc is soluble in a solution of cyanide of potassium.

Cross-Interrogatory 35: If an aqueous solution of cyanide of potassium will dissolve zinc oxide, will it not also dissolve the metallic zinc which is contained in the zinc dust described in the Waldstein Patent?

Cross-Interrogatory 36: Will not a large excess of metallic zinc as used in the McArthur-Forrest process tend to corrupt or in a large degree destroy the efficiency of a cyanide solution?

Cross-Interrogatory 37: Are you not of the opinion that the least amount of zinc which can by any process be used for the thorough precipitation of precious metals from the solution of cyanide of potassium, is much better and more profitable than to use a large excess of zinc beyond that which is necessary to thoroughly precipitate the contained gold?

Cross-Interrogatory 38: Did you ever hear of the use of the zinc dust described in the Waldstein Patent being used on a commercial scale at any reduction works prior to the application for this patent by Waldstein in connection with agitation or otherwise?

Cross-Interrogatory 39: If you are of the opinion that a voltaic or electric couple is formed between the metallic zinc and the zinc oxide contained in the zinc dust which hastens precipitation, is there any method known to the art of metallurgy or chemistry by which the strength or efficiency of the electric current thus generated can be determined in so far as it expedites precipitation of the precious metals from a cyanide solution; and if there is any such method, please describe it and state your experience in connection with such tests.

Cross-Interrogatory 40: If such voltaic couple is formed or electro-lytic action is produced by the thorough agitation of so finely divided precipitating medium as zinc dust in a state of thorough agitation through the whole volume of the solution, would not the electrolytic effect be instant and all pervading and the general result very much hastened by the use of this subtance described in the patent?

Cross-Interrogatory 41: Have you read the testimony in this case of Professors Tuttle or Monroe touching their opinion as to the formation of a voltaic couple and the effect of such electro-lytic action thus produced in the precipitation of precious metals from solution of cyanide of potassium, and if you have in what respects do you differ from them?

Cross-Interrogatory 42: State whether you have found a large saving of both metallic zinc and cyanide potassium by the use of the Waldstein or zinc dust process as against the use of filiform zinc or other forms of zinc as used in the McArthur-Forrest process or any other processes known to you.

Cross-Interrogatory 43: If you have ever noted the percentages of loss by the several processes, state what in your judgment is the saving by the use of zinc dust in a cyanide solution in the state of agitation over the other processes both as to time consumed and loss of zinc and cyanide of potassium.

Respondent objects to the 15th of the foregoing cross-interrogatories, on the ground that it is immaterial and incompetent, and asks for hearsay testimony.

Respondent objects to the 17th of the foregoing cross-interrogatories as unintelligible and misleading, and assuming that the precipitation referred to is merely theoretical and not actual; and on the further ground that it does not appear what counsel mean by theoretical precipitation.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR, Complainant, vs. THE DE LAMAR MINING COMPANY, LIMITED, Respondent.	No. 177.

Deposition of W. J. Sharwood.

Deposition of W. J. Sharwood, a witness produced, sworn, and examined the first day of October, in the year nineteen hundred at Marysville, in the county of Lewis and Clarke, in the State of Montana, under and by virtue of the annexed commission to me directed, issued out of the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central

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Division, in a certain cause therein pending and at issue wherein Joseph R. De Lamar is complainant and The De Lamar Mining Company, Limited, is respondent, as follows:

W. J. Sharwood of Marysville, Lewis and Clarke County, State of Montana, the witness mentioned in the annexed commission and in the direct and cross-interrogatories hereto attached, being by me first duly sworn to testify to the truth, the whole truth, and nothing but the truth, doth depose and say as follows:

First.—To the first interrogatory he saith: My name is William J. Sharwood; age, thirty-three; present residence, Marysville, Montana; occupation metallurgical chemist.

Second.—To the second interrogatory he saith: I received the degree of Associate of the Royal School of Mines, London, in 1887, when I completed the regular three-year course at the School of Mines and was awarded the medal given in the Mining course there. I studied chemistry there under the late Professor Edward Frankland, and metallurgy under Professor Roberts-Austen, having previously studied chemistry at a private school in England. In August, 1892, I was appointed Instructor in Chemistry at the University of California and held that position until I resigned in 1898. Since 1885 I have made a special study of the chemistry and metallurgy of gold and silver, and am familiar with the principal books and the leading scien-

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tific and technical literature on these subjects. I am more particularly familiar with the literature and practice relating to the amalgamation of gold, and the cyanide process for extracting gold and silver from ores. During and since 1892 I have conducted numerous researches on the chemistry of the cyanides, their action on metals, methods of analyzing their products, and allied subjects; results of some of these have been published in the Journal of the American Chemical Society and the Engineering and Mining Journal, in 1897 and 1898.

Third.—To the third interrogatory he saith: During five years prior to September, 1892, I was engaged chiefly in practical work about mines and mills in California. For about a year, during 1888, I was assayer, and mill foreman at the Black Oak Mine, where amalgamation and vanner and canvas concentration were used; I also had charge of the valuation and shipment of concentrates there; for about six months I held a similar position at the Golden Gate Mill, California, milling high-grade gold ore and employing concentration. At various times, aggregating about a year and a half, I have run an amalgamating gold mill, taking the regular twelve-hour shift. For a short time I worked underground in a mine. During the remainder of the five years mentioned, and occasionally since I was engaged—usually while acting as assistant to my father—in designing, drawing plans, and laying out the ground for mining machinery; also in sampling mines, making occasional

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surveys—that is, in general mining engineering. As to the precipitation of gold and silver, I worked for a short time in a chlorination works in order to get some experience with that process; I have also visited numerous metallurgical works for the same purpose and have seen many processes at work, both in the laboratory and on the large scale, including the hypo-sulphite process for silver, and the cyanide process. In the latter I have seen precipitation effected on the working scale by the McArthur system, by the Fraser process, and also with zinc dust. Since April, 1898, I have acted as chemist and assayer at the tailings plant of the Montana Mining Company, Limited, where the cyanide process is in use; that is I have been employed there during the working seasons. I have analyzed numerous metallurgical products.

Fourth.—To the fourth interrogatory he saith: I am familiar with it. My attention was first called to it in 1890 through an article published then.

Fifth.—To the fifth interrogatory he saith: The gold and silver are got into solution as double alkaline cyanides; they are then precipitated by causing the solution to filter through boxes or compartments packed with zinc shavings. The zinc is gradually dissolved and the precious metal is precipitated, much of it adhering to the undissolved portion of the zinc. When cleaning up the coarser part of the unconsumed zinc is usually removed by sifting. The sifted product, when dry, is a

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gray or brownish powder, in the samples which I have seen, consisting chiefly of zinc, gold and silver. Analyses published on good authority show it also to contain more or less copper, lead, lime and other substances, which had passed into solution from the ore, or were originally present as impurities in the zinc used. The chemistry of the precipitation process may be stated thus: we start with a solution containing gold or silver in the form of a double cyanide of gold, or of silver, with potassium, or sodium; in contact with metallic zinc this is decomposed, the precious metal changing places with a portion of the zinc, so that the final products are a double cyanide of zinc with potassium, or with sodium, and metallic gold or silver. These are generally admitted facts, but there appears to be some complex intermediate steps in the reaction, and there is no very general agreement among chemists as to exactly how these steps occur.

Sixth.—To the sixth interrogatory he saith: They are used to precipitate the gold or silver because the inventor found this form the most effective as a so-called metallurgical filter.

Seventh.—To the seventh interrogatory he saith: It is certainly more advantageous to use the shavings. This is chiefly because the reaction between the zinc and the gold or silver compounds in solution can only take place at the surface of contact of solid and liquid. Other things being equal, the rate of precipitation will vary

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directly as the surface area which the zinc exposes to the solution. It is therefore desirable to give the largest possible relative surface to the zinc, it is also desirable to distribute the zinc uniformly through the filtering boxes and at the same time prevent its packing and impeding the slow flow of solution. The thinnest possible shavings appear to be the best form in which to use ordinary zinc as a filter for flowing solutions, giving the most rapid precipitation for a given weight of zinc, or the minimum weight of zinc for a given surface, while not impeding circulation.

Eighth.—To the eighth interrogatory he saith: The solution is collected in tanks about twenty-two feet in diameter; when none of these is full to a depth of about fourteen feet, it is stirred by compressed air; zinc dust is added and stirring continued a minute or two longer; then the entire contents of the tanks are pumped through one or more filter presses in which the undissolved zinc and the precipitated metals accumulate until a clean-up, when the presses are opened and the contents dried and sifted. The minute details of the process I am not at liberty to explain or disclose. I am employed by the Montana Mining Company during the working periods of the plant, as assayer and chemist; I make or superintend the daily assays of tailings and solutions, and sample and make assays and occasional analyses of the various products; during the absence of Mr. Merrill, the metallurgist of the plant, I have general charge of the chemical treatment.

(Deposition of W. J. Sharwood.)

Ninth.—To the ninth interrogatory he saith: I have read it and believe that I understand it.

Tenth.—To the tenth interrogatory he saith: There are several points of difference. The Waldstein Patent, as I understand it, specifies the following essential features: Firstly, the use of an exact and predetermined amount of zinc dust, a test being made to determine the exact quantity which a given body of solution requires. Secondly, all this zinc is absorbed or dissolved. Thirdly, there is no fouling of solution by this process. Fourthly, agitation is effected by one or more revolving paddles. Fifthly, this agitation is continued until all minerals are precipitated. In the practice at the Montana Mining Company's plant, on the other hand, some of the essential features are: Firstly, a considerable excess of zinc dust is used, no preliminary tests being made to govern the exact proportion. Secondly, a very large proportion of this zinc remains undissolved. Thirdly, the solutions become fouled by zinc, as a large amount of zinc is, in the aggregate, dissolved. Fourthly, agitation is effected by compressed air. Fifthly, agitation continues only a few minutes and filtering is commenced while a considerable proportion of the gold and silver are still unprecipitated.

Eleventh.—To the eleventh interrogatory he saith: I should treat the ore with the solvent and draw the gold-bearing solution into the receptacle mentioned in line sixty-six of the specification. At this stage a test has

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to be made to determine the exact quantity of zinc dust which that body of solution requires; no method of doing this is stated, and I know of none. If this first difficulty were overcome I would add the exact amount of zinc dust in the proper tank and agitate with the paddle; at this point a second difficulty occurs as to when to stop agitation, as I know of no ready means of determining when all the precious metals—which I presume to be included in the term minerals in line eighty-eight —have been precipitated. I should then pass the contents of the tank to a filtering press, but it would then certainly have become fouled to some extent by the zinc dissolved, also, the zinc having been all dissolved, the solution would surely begin to act on the gold already precipitated and redissolve it at least partially.

Twelfth.—To the twelfth interrogatory he saith: I believe it absolutely impossible to carry out the process there described, for two conditions are laid down that are absolutely contradictory and incompatible: firstly, that "the solution so reused must not contain any zinc"; secondly, that the "zinc dust is absorbed." There is another practical and economical objection which would prevent its successful use in practice, owing to the resolution of the gold and silver when the zinc has been removed.

Thirteenth.—To the thirteenth interrogatory he saith: It is not.

Fourteenth.—To the fourteenth interrogatory he saith: It is soluble. The rapidity depends on many con-

(Deposition of W. J. Sharwood.)

ditions, strength of solution, temperature, and fineness of division. I once made a series of tests and found for instance that the fine powder got by burning zinc in air would dissolve in a solution of one-quarter of one per cent potassium cyanide within ten minutes, or in a one per cent solution in less than one minute; zinc oxide recently precipitated is much more rapidly dissolved under the same conditions.

Fifteenth.—To the fifteenth interrogatory he saith: As the oxide appears to form a coating upon the particles of zinc dust I believe it is detrimental in effect, retarding the contact of the solution and the metallic particles.

Sixteenth.—To the sixteenth interrogatory he saith: I believe it has no beneficial effect. I made some experiments on precipitation with zinc filings gauged to a uniform size, some of which were used in the bright metallic state, while other portions were coated with zinc oxide. In some experiments there was comparatively little difference in the results; in others the oxide-coated particles were much less effective than the others, equal weights of metallic zinc being used. On the whole the clean metallic particles were decidedly more effective in precipitation of gold from a cyanide solution.

Seventeenth.—To the seventeenth interrogatory he saith: It can be dissolved by the common acids: dilute hydrochloric, nitric, sulphuric, or acetic acid; also in solutions of alkaline cyanides, ammonium chloride and less readily by some other ammonium salts, aqua ammonia, or caustic potash or soda solution.

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Eighteenth.—To the eighteenth interrogatory he saith: The metallic zinc remains, or the greater portion of it, but any of the solvents mentioned will dissolve metallic zinc more or less. From the fact that the envelope of oxide is removed the remaining zinc would act more rapidly after such treatment, as it comes at once into immediate contact with the solution; but the fact that the solvent removes also some of the zinc may possibly complicate its conditions.

Nineteenth.—To the nineteenth interrogatory he saith: It is soluble in a solution of any alkaline cyanide, in presence of oxygen or any suitable oxidizing agent, and also in some double cyanides, such as potassium zinc cyanide.

Twentieth.—To the twentieth interrogatory he saith: Under the conditions mentioned the gold would at once begin and continue to redissolve in the solution, as soon as the zinc had disappeared, unless steps had been taken first to remove all air or oxygen from the solutions and absolutely to exclude air from them until after the removal of the precipitated gold; I think this would render the process a failure in practice.

Twenty-first.—To the twenty-first interrogatory he saith: My experience is that it is absolutely necessary to use an excess of zinc dust in precipitation, so that a very considerable amount of metallic zinc may remain undissolved and protect the gold and silver in the filter presses from the action of the solution passing through; this it does by forming with either of them a couple in which the more positive element zinc is dissolved and

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the precious metal protected. In my experience on the large scale there must be free zinc in the presses with the gold and silver, otherwise the solutions passing out of them will carry values too high to be tolerated in economical practice.

Twenty-second.—To the twenty-second interrogatory he saith: I do not know exactly certainly many years; the first printed mention that I recollect positively is in a book published twenty years ago.

Twenty-third.—To the twenty-third interrogatory he saith: It has been mentioned in technical journals for ten years, or thereabouts.

Twenty-fourth.—To the twenty-fourth interrogatory he saith: To facilitate the reaction or lessen the time required, by bringing the greatest possible volume of solution into contact with a given surface of the zinc in a given time.

Twenty-fifth.—To the twenty-fifth interrogatory he saith: A very long time; the first date I can fix positively is December eighteenth, 1866, the date of United States Patent 60,514, granted to William Henderson for precipitating copper and silver by iron powder, he says, "it should be gradually added to a copper solution, with constant agitation, and it will be found to precipitate copper and silver from their solutions with great rapidity." Agitation has also been used for mixing glycerin with acids in the manufacture of nitroglycerin, in this case by means of compressed air, and in all chemical laboratories it is in constant use.

(Deposition of W. J. Sharwood.)

Twenty-sixth.—To the twenty-sixth interrogatory he saith: I think it must be very feeble and am certain that it has no practical beneficial effect. In experiments which I made on the precipitation of gold and silver from cyanide solutions by zinc—using mechanically divided zinc, which in some cases had bright metallic surfaces and in others was superficially oxidized—comparing the effects of equal quantities under like conditions there was no advantage in favor of the oxide-containing material. On the other hand, when such zinc had been alloyed with a small proportion of lead, a metal known to set up a galvanic couple with zinc, I found that, using equal weights in a like state of division, there was a considerable increase in precipitation with the zinc which contained lead as compared with the lead-free zinc.

Twenty-seventh.—To the twenty-seventh interrogatory he saith: Assuming such a couple formed having a slight beneficial action in precipitation. I think this advantage would be counter-balanced by the retarding effect of the zinc oxide enveloping the metallic particles and delaying their contact with the solution. Also the influence of the zinc-oxide couple must be very small compared with that of the couples set up by the zinc with its contained impurities, such as lead, and with the powerful gold zinc and silver zinc couples which are formed the instant that the precious metals begin to precipitate.

Twenty-eighth.—To the twenty-eighth interrogatory he saith: I think the advantage of increased metallic

(Deposition of W. J. Sharwood.)

surface fully as great as that of the couple, supposing the couple to be beneficial.

Twenty-ninth.—To the twenty-ninth interrogatory he saith: I have read it. Professor Whitehead makes no mention as to the relative fineness of the sample of mechanically divided zinc he used, as compared with the zinc dust. If his mechanically divided zinc was in only a moderately fine state of division, such, for instance, as the filiform zinc of the MacArthur Patent, then the zinc dust would have a distinctly unfair advantage, as the greater part of commercial zinc dust is in an extremely fine state of division, exposing a very large surface. Again, his experiments do not prove much as regards working conditions with ordinary material; the solution used was so much richer in gold than those commonly met with in practice; there was forty milligrammes of gold in one hundred cubic centimetres, which corresponds to eleven and seven-tenths ounce per ton of solution, or about two hundred and forty dollars value per ton. This is at least fifty or sixty times as rich as the average solutions I have met with in practical work, having assayed samples from at least a quarter of a million tons of solution before their precipitation. Again, the percentage of potassium cyanide in his solution was decidedly higher than the average strength in use on the large scale. The principal criticism I make, however, is on the failure to indicate the degree of fineness of the mechanically divided zinc as compared with the dust.

(Deposition of W. J. Sharwood.)

Thirtieth.—To the thirtieth interrogatory he saith: I have made a number of such experiments.

Thirty-first.—To the thirty-first interrogatory he saith: The experiments to be described were made here in April, 1899, at the suggestion of Mr. C. W. Merrill, to determine whether the efficiency of zinc dust as a precipitant were really due to some inherent virtue in the dust or merely to its state of division, and whether ordinary zinc, reduced to a like state of division, would not be as effective. Some preliminary tests with zinc filings, in a coarser state than zinc dust, showed that these comparatively coarse filings precipitated less gold from cyanide solutions than equal weights of the zinc dust under like conditions. Metallic zinc was next reduced to an exceedingly fine state of division, by mechanical means, and without exposing it to oxidation: its state of division being comparable with that of zinc dust. This product I shall refer to as comminuted zinc, to distinguish it from zinc dust proper—the substance described in Waldstein's patent. The first series of tests were made wtih a solution of nearly the same composition as that used by Professor Whitehead; one hundred cubic centimetres of it contained thirty-nine milligrammes of gold and four-tenths gram of potassium cyanide. A number of portions of this solution were measured out, each of one hundred cubic centimetres, each was treated with fifty milligrammes of zinc—that being the least proportion used by Professor Whitehead—then agitated

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for four minutes, the conditions being kept as nearly as possible identical in the five experiments made, then filtered at once; the amount of gold removed from solution was then determined by assaying the filtered liquid by a method found to give very accurate results, the original solution having been assayed in the same way. The percentage of the originally contained gold precipitated by the zinc dust, under the conditions stated from this rich solution, were sixty-one per cent and sixty-one and a half per cent, in two parallel tests. The percentages of the originally contained gold precipitated by the same weights of comminuted zinc, in three similar tests under like conditions were, respectively, ninety-one and seven-tenths, ninety-one and seven-tenths and ninety and two-tenths. As this solution was too rich in gold to give a fair idea as to results obtainable in ordinary work, further tests were made with a sample taken from about three hundred tons of a working solution just ready to be precipitated. This solution contained, in one hundred cubic centimetres, only six one-hundredths of a gram of potassium cyanide, and only fifty-seven one-hundredths of a milligramme of gold, with two and eight-tenths milligramme of silver in addition. One hundred and fifty cubic centimetres of this solution were taken for each of the following tests, and to each such volume there was added seventy-five milligrammes of zinc, thus maintaining the same proportion of zinc to solution as in the previous cases. Agitation was continued for four

(Deposition of W. J. Sharwood.)

minutes as before. Two tests with zinc dust gave a precipitation of eighty-six and eighty-three per cent respectively of the gold, while two parallel tests with comminuted zinc gave a precipitation of ninety-four and ninety-six per cent of the gold. At the same time the silver precipitated by the zinc dust was found to be ninety per cent of the original contents in each case; by the comminuted zinc it was ninety-four and ninety-three per cent respectively. Several other tests were made with similar results, but as most of them were not duplicated and less care was taken in some to secure exactly parallel conditions between the zinc dust and comminuted zinc, they were less conclusive. The results quoted prove conclusively that ordinary metallic zinc can be made equal or superior, weight for weight, to zinc dust as a precipitant for gold and silver from cyanide solutions, if it be reduced to a sufficiently fine state of division.

Thirty-second.—To the thirty-second interrogatory he saith: I do not recollect anything material.

And to the cross-interrogatories attached to said commission said witness doth depose and say as follows:

First.—To the first cross-interrogatory he saith: I have never had direct supervision of a plant using that process. I first read of it about 1890, and shortly afterwards began some experiments on a laboratory scale. I saw an experimental plant worked by the lessees of the MacArthur-Forest patents in San Francisco early in 1894 or in 1893; about 1895 and several times since, I have

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seen the process or a modification of it in use at the Black Oak Mine in California, and have seen the working details of its operation there. I have analyzed and examined products from that and other plants using the process. I have read most of the papers published by various metallurgists in this country and throughout the world, describing the process and giving details of its operation, especially in South Africa and Australasia.

Second.—To the second cross-interrogatory he saith: I have examined and analyzed solutions from plants working on material of very varied character. At the Black Oak Mine the tailings after concentration contained a considerable proportion of copper and other sulphides; the material treated at another plant was almost absolutely free from sulphides.

Third.—To the third cross-interrogatory he saith: I have no personal knowledge of the percentage recovered at such plants, it must necessarily vary greatly with the nature of the ores or tailings treated and with the details of the treatment employed.

Fourth.—To the fourth cross-interrogatory he saith: I have no direct personal knowledge, but from statements made public by various mining companies, I understand that the weight of zinc used per ton of ore or tailings ranges from about a quarter of a pound downward. It is impossible to state in general the effects of other metals on such consumption; there are so many other circumstances to be considered having equal or

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greater influence, such as the strength and alkalinity of the solution, its proportion to the ore treated, and the temperature.

Fifth.—I do not know the amount used with free-milling materal as distinguished from more refractory ores, and do not know of any necessary difference greater might occur than between two ores of the same class; from general information I believe about two-tenths pound per ton of material a fair average, but it varies also from other causes as stated in my last answer.

Seventh.—To the seventh cross-interrogatory he saith: The loss of either may be increased in certain cases by the presence of certain base metals, but there are other cases in which base metals have no effect, and in others the consumption of one or other may be reduced thereby.

Eighth.—To the eighth cross-interrogatory he saith: The zinc dust used at the Montana Mining Company's plant is the metallurgical product which I understand to be described in lines ninety to ninety-seven, inclusive, of the Waldstein Patent. The method of preparing this material I am not at liberty to disclose.

Ninth.—To the ninth cross-interrogatory he saith: I am not at liberty to disclose certain details of the process mentioned, that process not having been patented nor made public property.

Tenth.—To the tenth cross-interrogatory he saith: I am not at liberty to disclose certain details of the process mentioned.

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Eleventh.—To the eleventh cross-interrogatory he saith: I first heard of its use either in 1896 or 1897.

Twelfth.—To the twelfth cross-interrogatory he saith: I did not.

Thirteenth.—To the thirteenth cross-interrogatory he saith: I had not investigated its use prior to hearing of its being used there.

Fourteenth.—To the fourteenth cross-interrogatory he saith: I have no knowledge of such use for that purpose.

Fifteenth.—To the fifteenth cross-interrogatory he saith: I have no knowledge of such purchase or agreement.

Sixteenth.—To the sixteenth cross-interrogatory he saith: as I understand the question my answer is that, if the metals referred to are once preciptated, that is separated or thrown out of solution, as nearly completely as is possible in practice, then they are thoroughly precipitated, in the usual acceptation of the term, and as I understand its meaning as set forth in the second claim mentioned, and the fact of their precipitation is unaffected by any possible subsequent redissolving in whole or in part. In answering direct interrogatories eleven and twelve I did not intend to convey the idea that no precipitate of precious metal would be obtained, but that the amount of such precipitate might be very materially reduced.

Seventeenth.—To the seventeenth cross-interrogatory he saith: As I understand chemical phraseology, precipi-

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tation is a matter of fact and not of theory, and the words "theoretical precipitation" as used here do not convey any clear meaning. If any metal is thrown down from its solution, such as copper by metallic iron, as nearly completely as is possible in practice, then I consider it completely or thoroughly precipitated; the fact of its having been thoroughly precipitated would not, in my opinion, be influenced by its subsequent partial or complete redissolving, nor by any steps taken to keep it from redissolving. On the other hand, if a considerable proportion, say, ten per cent, of such copper had failed to be thrown out of solution at all by the iron, then I should not consider it as thoroughly precipitated.

Eighteenth.—To the eighteenth cross-interrogatory he saith: No, in some cases a slight excess may be used; in others a large excess is always employed so far as I have seen, as, for example, in the precipitation of silver by copper, or of copper and silver by metallic iron, or in the use of zinc in any form for precipitating precious metals. In other cases, a deficiency of precipitating agent is intentionally employed, as in recovering silver and gold from their solutions in the hypo-sulphite process and its modifications.

Nineteenth.—To the nineteenth cross-interrogatory he saith: In most cases probably an excess of some sort would be used; in the special case mentioned of an aqueous cyanide solution containing gold and silver a large excess is necessary to precipitate and keep down

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the precious metals, the excess varying with the circumstances—say from ten to fifty times the amount calculated from the chemical equivalents of these metals, when the precipitating agent is zinc.

Twentieth.—To the twentieth cross-interrogatory he saith: The theoretical amount necessary will depend upon what theory is followed: in the specification, Waldstein does not intimate or disclose any particular theory or principle to be followed in estimating the amount of precipitant either for a given quantity of precious metal, or for a given volume of solution. If it is his intention to be guided by the chemical equation and consider the amount of zinc dust which is exactly equivalent chemically to the gold present—that is, thirty-two and seven-tenths parts by weight of zinc to one hundred and ninety-seven of gold, or nearly one of zinc to six of gold—as the theoretical quantity, then a solution containing half a troy ounce of gold per ton, or about ten dollars value per ton would require nearly one-twelfth troy ounce of metallic zinc per ton. One hundred tons of such solution would then require eight and one-third troy ounces of metallic zinc, or four-sevenths of a pound avoirdupois. If this is what is meant by the actual theoretical amount, I should consider it altogether inadequate, and should be inclined to add a large and not a slight excess, say from ten to fifty times the amount thus calculated, if the gold is to be thoroughly precipitated and then kept undissolved, and this excess I should vary somewhat accord-

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ing to the length of time the gold was to be kept undissolved in contact with the solution, and with the solvent power of the solution.

Twenty-first.—To the twenty-first cross-interrogatory he saith: I do not consider such an excess—say of ten to fifty times the amount calculated on the above theory—as a definite or exact amount, though I am unable to say how nearly it is possible to predetermine such quantity by the process described in the said patent.

Twenty-second.—To the twenty-second cross-interrogatory he saith: I am not at liberty to give details of the quantities used at that plant, and cannot answer the question without giving a detailed explanation of such quantities.

Twenty-third.—To the twenty-third cross-interrogatory he saith: I cannot answer this question without giving a detailed explanation of the system employed; this I am not at liberty to do.

Twenty-fourth.—To the twenty-fourth cross-interrogatory he saith: I am not acquainted with any plants using that process.

Twenty-fifth.—To the twenty-fifth cross-interrogatory he saith: Tailings only are treated.

Twenty-sixth.—To the twenty-sixth cross-interrogatory he saith: The amount is, as a rule, determined at some stage of the treatment.

Twenty-seventh.—To the twenty-seventh cross-interrogatory he saith: That is usually done at some stage or other of the treatment.

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Twenty-eighth.—To the twenty-eighth cross-interrogatory he saith: The contents in gold or silver of tailings or solutions are determined, when necessary, by assay.

Twenty-ninth.—To the twenty-ninth cross-interrogatory he saith: I have already stated that the amount used is largely in excess of that required to produce precipitation.

Thirtieth.—To the thirtieth cross-interrogatory he saith: I do not know of any general law of pecipitation here involved; in the particular case of the Waldstein Patent I think most chemists would understand that definite quantity of zinc dust, if any quantity can be definitely determined, which would produce precipitation, that is, which would throw down the precious metals as completely as possible. The idea of keeping them down or making them stay precipitated introduces very indefinite factors, as the additional quantity of zinc dust for this purpose must vary with the alkalinity of the solution the percentage of alkali-metal cyanide it contains, the accessibility of air, the volume of solution which is going to pass through or over the precipitate, the time it is exposed to such solution, or other factors; so that a practical metallurgist would probably use a rather large excess in order to be on the safe side.

Thirty-first.—To the thirty-first cross-interrogatory he saith: I found that it did not preciptate them from such solution, and also that a potassium cyanide solution, saturated with zinc oxide, had still some solvent action on

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metallic gold and silver. I shook solutions of potassium cyanide containing dissolved gold with varying proportions of zinc oxide. When in small or moderate proportions the zinc oxide dissolved completely and there was no trace of a precipitate. When added in large proportions, some of the zinc oxide remained undissolved, but only traces of the gold contents were removed from the solution. To a similar solution containing silver several proportions of zinc oxide were added, but no silver was found to be precipitated.

Thirty-second.—To the thirty-second cross-interrogatory he saith: Both are more or less readily soluble.

Thirty-third.—To the thirty-third cross-interrogatory he saith: Not necessarily.

Thirty-fourth.—To the thirty-fourth cross-interrogatory he saith: It is soluble.

Thirty-fifth.—To the thirty-fifth cross-interrogatory he saith: It will dissolve to some extent, depending on the time of contact, strength of solution, and other factors.

Thirty-sixth.—To the thirty-sixth cross-interrogatory he saith: A large excess of metallic zinc added in any form, will dissolve more or less and thus render the solution impure, but will not necessarily do much harm; it is a well-known fact that zinc does not accumulate in cyanide solutions beyond a certain point, but is apparently removed therefrom in their passage through the ores or tailings treated. The efficiency of such solutions, so far as I can judge, is not much impaired by the presence of

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considerable quantities of zinc, and this opinion is upheld by many published statements. In many plants solutions have been in use for months or years where zinc shavings have been used. I have known of solutions which had to be thrown away, but none on account of accumulated zinc.

Thirty-seventh.—To the thirty-seventh cross-interrogatory he saith: It is evidently desirable to use as little of any kind of zinc as will suffice to precipitate the precious metals as nearly completely or thoroughly as possible, and, in addition, prevent their redissolving; the latter condition, however, appears to necessitate the use of a large excess, in whatever form the zinc may be used. The use of such an excess, that is more than sufficient to cover all possible contingencies, I consider profitable and good metallurgy, as it is more profitable to waste a good many pounds of zinc, costing a few cents per pound, than to risk the loss of an ounce or two of gold.

Thirty-eighth.—To the thirty-eighth cross-interrogatory he saith: I did not.

Thirty-ninth.—To the thirty-ninth cross-interrogatory he saith: To determine the efficiency of such a possible couple as to its possible influence on the precipitation mentioned, the only method that suggests itself to me is to make parallel experiments under conditions kept practically identical, giving a comparison between the precipitations, from equal volumes of the same solution, effected by equal weights in the same state of division,

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first of nearly pure metallic zinc, then of the same zinc in connection with zinc oxide, and then of the same zinc alloyed with a metal with which it is known to form a galvanic couple. I made such experiments as described in answer to interrogatory twenty-six in chief, and found that the zinc oxide appeared never to give any practical benefit in facilitating precipitation, but in most cases to retard it, while the lead zinc couple hastened precipitation of the gold and silver.

Fortieth.—To the fortieth cross-interrogatory he saith: If such a beneficial couple were formed by the substance described in the patent, the general results ought to be hastened in some sort of proportion to the electro-motive force generated, unless there were anything to counteract its effects, or some other stronger electrolytic effect were set up independently of the couple specified, as for instance by some other stronger couple. I am not prepared to say whether the distribution of the zinc would be thorough enough or its particles near enough together to make the effect all pervading, unless a very large quantity were used.

Forty-first.—To the forty-first cross-interrogatory he saith: I have not seen the testimony of Professor Tuttle. I read an affidavit by Charles E. Munroe, but do not recollect any mention of a voltaic couple therein.

Forty-second.—To the forty-second cross-interrogatory he saith: The only way in which a really fair comparison can be made between the MacArthur or zinc shavings

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system of precipitation against the Waldstein or any other form of zinc dust precipitation would be to take all the solution flowing from a given set of tanks or from an entire plant, mix it thoroughly, divide it equally and precipitate half by each of the two methods to be compared, continuing such parallel treatment for at least a month or over at least two clean-ups, in no other way can a reasonable comparison be made as the variations from day to day in the solvent power of the solutions, their strength when precipitated and so forth, influence the consumption of zinc so materially at a given plant, and still more so between two different plants. I have had an opportunity to make or observe any such comparison.

Forty-third.—To the forty-third cross-interrogatory he saith: It is impossible to make any such comparison, as the conditions differ so widely; for instance as to time, the zinc shavings process the solution flows continuously and is continuously precipitated, while in the zinc dust process a considerable volume of solution is allowed to accumulate and then rapidly precipitated. As to the loss of zinc and cyanide, I am of opinion that the differences between the consumptions at works using either precipitant on different materials or with different strengths of solutions, will be as great or greater than between the consumptions at works using the different processes on like materials.

W. J. SHARWOOD.

Subscribed and sworn to before me this 3d day of October, A. D. 1900.

[Seal] GEORGE W. PADBURY,

Notary Public in and for Lewis and Clarke County and State of Montana.

State of Montana,
County of Lewis and Clarke } ss.

I, George W. Padbury a notary public in and for said county and State, and the Commissioner named in the annexed commission, hereby certify that the above witness, W. J. Sharwood, was by me first duly sworn to testify the truth, the whole truth, and nothing but the truth; that I propounded to him all the direct and all the cross-interrogatories annexed to said commission, and that his answers thereto were reduced to writing by Maurice Deering, Jr., in the presence of said witness, and when completed read over to said witness by me, and subscribed by said witness in my presence; that said deposition was taken pursuant to the annexed commission and stipulation, at my office at Marysville in said county, beginning on the 1st day of October, 1900, and was completed on the 3d day of October, 1900; that I am not counsel or relative of either party, or otherwise interested in the event of this suit.

In testimony whereof, I have hereunto set my hand and official seal this 3d day of October, 1900.

[Seal] GEO. W. PADBURY,

Notary Public in and for Lewis and Clarke County, State of Montana.

Fees: Notary, $15.00; stenographer and typewriter, $33.60; witness, 3 days.

[Endorsed]: No. 177. Opened by order of Court and refiled April 17, 1901. A. L. Richardson, Clerk.

In the Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR,
Complainant,
vs.
THE DE LAMAR MINING COMPANY, LIMITED,
Respondent.
No. 177.

Objections to Certain Interrogatories and Answers in Deposition of W. J. Sharwood.

Objections of complainant to certain interrogatories and answers thereto in deposition of W. J. Sharwood, taken under stipulation of solicitors for complainant and respondent in the above cause.

Now, comes the complainant Joseph R. De Lamar, by his solicitors, and in pursuance of the terms of said stipulation objects to interrogatory fifteen propounded by solicitors for respondent to said witness, upon the ground that said question assumes and states that the witnesses for the complainant have testified that zinc dust generally stated and not as described in the Waldstein Patent is a mixture of metallic zinc and zinc oxide, which assumption and statement is not correct.

Complainant objects to interrogatory twenty upon the ground that the said question is a statement by counsel of the construction of the contents of the Waldstein Patent touching the method of the use of zinc dust therein described, and is an assumption that no excess whatever of such zinc dust shall be used in the process described in said patent; and complainant further objects to the answer of the witness to said interrogatory twenty upon such assumption of the true meaning of said patent.

Complainant objects to interrogatory twenty-two upon the ground that the witness has not shown himself qualified or competent to answer the question, and upon the further ground that the testimony of the witness touching the knowledge of other chemists and of the literature upon the subject is not the best evidence.

Solicitors for complainant object to interrogatory twenty-three upon like grounds as stated in objection to interrogatory twenty-two.

Solicitors for complainant object to interrogatory twenty-five, and to the answer of the witness thereto, upon the ground that the witness has not shown himself competent to answer the question. It does not appear from the testimony of the witness that he has the means or has pursued the sources of information in order to determine how long a period agitation has been known to chemists as an efficient method of bringing two substances into close contact when in solution, and that the question is irrelevant and immaterial and incompetent for the reasons above stated.

Solicitors for complainant object to interrogatory twenty-nine and to the testimony given by the witness in answer thereto, upon the ground that the same is wholly irrelevant and immaterial, and upon the further ground that it does not appear that the affidavit of Prof. Whitehead is in the file wrapper contents of the Waldstein Patent, and that any criticisms of the witness upon any experiments made by Professor Whitehead are not material.

Solicitors for the complainant object to interrogatory thirty, and to the testimony of the witness given in answer to same, upon the ground that the same is irrelevant and immaterial; that it is wholly immaterial what the relative value of metallic zinc reduced to state of fine division as a precipitant as compared with the zinc dust described in the Waldstein Patent.

DICKSON, ELLIS & ELLIS,
Solicitors for Complainant.

[Endorsed]: No. 177. Circuit Court of the United States, Ninth Circuit, in and for the District of Idaho. Joseph R. De Lamar, Complainant, vs. The De Lamar Mining Company, Limited, Respondent. Objections to Interrogatories and Testimony. Filed October 4th, 1900. A. L. Richardson, Clerk. Dickson, Ellis & Ellis, Solicitors for Complainant.

In the Circuit Court of the United States, for the District of Idaho, Central Division.

IN EQUITY.

JOSEPH R. DE LAMAR, Complainant, vs. THE DE LAMAR MINING COMPANY, LIMITED, Respondent.	No. 177.

Deposition of Thomas Price.

Be it remembered, that pursuant to the mutual agreement and stipulation of parties, and on the first day of October, 1900, at room 15, eighth floor of the Mills Building, corner of Montgomery and Bush streets, in the city and county of San Francisco, State of California, before me, Clement Bennett, a notary public in and for said city and county of San Francisco, duly appointed and commissioned to administer oaths, personally appeared Thomas Price, produced as a witness on behalf of the respondent in the above-entitled cause, now pending in said Circuit Court of the United States for the District of Idaho; that the said witness was by me duly sworn to testify the truth, the whole truth, and nothing but the truth, and was thereupon examined and interrogated by John H. Miller, Esq., counsel for the respondent, and by A. C. Ellis, Jr., Esq., counsel for the complainant, and testified as follows:

(Deposition of Thomas Price.)

Thomas Price, called for the defendant, sworn.

Mr. MILLER.—Q. State your name, age, residence, and occupation.

A. My name is Thomas Price; age, 64; residence, San Francisco; occupation analytical and general chemist.

Q. State what experience you have had in matters relating to chemistry in general, and especially as to the chemistry of mining and the reduction of ores.

A. My education in chemistry was at the Normal College, Swansea, University College of London, and the Royal School of Mines, London.

Q. Where have you been engaged in practicing your profession?

A. I was engaged in practicing my profession forty-eight years ago in Swansea, having charge of the chemical laboratory of the Normal College, and also the chemist of several of the metallurgical establishments in the same town, Swansea.

Q. How long have you resided in California?

A. I have resided in California since October, 1862.

Q. What has been the nature of your business since you have been in California?

A. My business has been connected with metallurgical and analytical chemistry, as well as the examination of mines and making reports on various processes for the extraction of the useful metals. I have also, during a portion of that time, probably for a period of about ten years, twelve years after I reached here, been Pro-

(Deposition of Thomas Price.)

fessor of Chemistry and Toxicology in the Toland Medical College, now the Medical Department of the University of California, and in the Cooper Medical College, in the same branch.

Q. In the practice of your profession, have you had occasion to examine or come in contact with what is known as the MacArthur-Forrest cyanide process for recovering metals from cyanide solutions?

A. Yes, sir.

Q. Have you had occasion to examine or to come in contact with the chemistry of zinc as used for a precipitant for precious metals from cyanide solutions?

A. Yes, sir, I am thoroughly familiar with the metallurgy of zinc in all its forms. Swansea is the only place in Great Britain where zinc is manufactured, and since the MacArthur-Forrest process has been known, I have kept continually in touch with the details connected with the recovery of gold from cyanide solutions by means of zinc in its various forms.

Q. Were you familiar with the manufacture of zinc as practiced at Swansea?

A. Yes, sir, ever since about 1854 or 1855.

Q. What is the affinity of zinc for gold when used as a precipitant for gold from solutions carrying gold?

A. When zinc is placed in a solution holding gold in solution, the zinc will precipitate the gold in equivalent quantities.

Q. How long has zinc been known as a precipitant for gold from solutions carrying gold?

(Deposition of Thomas Price.)

A. The earliest that I know of that would be, of course, in connection with the precipitation of metals from photographic solutions, and other solutions that may contain it; for instance, when you place zinc in a solution of any metal that is less oxidizable than itself, it will throw that metal down in a metallic state, the zinc going into solution in equivalent quantities. For instance, to make an illustration: If lead is in solution, and 32½ parts of metallic zinc be added to it, it will throw down 104 parts of lead.

Mr. ELLIS.—I move to strike out the answer as not responsive to the question.

Mr. MILLER.—Q. Explain in brief what is the chemistry of the cyanide process of precipitating gold from cyanide solutions by means of zinc.

A. When zinc is brought in contact with solutions of gold and cyanide of potassium, the zinc will throw down the gold in the metallic form.

Q. Is zinc soluble in a cyanide solution?

A. Yes, sir; zinc is more or less soluble in cyanide of potassium.

Q. In what form was zinc first used in the cyanide process of throwing down the metals from cyanide solutions?

A. It has been used in three different forms: One in the form of threads of zinc prepared by means of a lathe, and the zinc would come out in the form of threads; then again, zinc shavings and zinc which they call a filiform.

(Deposition of Thomas Price.)

There is not much difference between the filiform zinc and the zinc shavings.

Q. What do you mean by the "filiform zinc"?

A. Very thin; films of zinc. It is all made in a different kind of lathe. One lathe will bring it out in the form of small threads, in a spiral form, and also in the form of shavings; curled shavings.

Q. What is the object of having it in filiform or shavings form?

A. The object is, in order that the smallest possible quantity by weight of zinc shall have the greatest possible volume of surface.

Q. What is the object in having the greatest extent of surface of zinc?

A. In order that the gold may be thrown down more rapidly from its solutions.

Q. Is the throwing down of the gold, as far as the rapidity is concerned, proportionate to the extent of surface of the zinc?

A. Yes, sir; but at the same time also in proportion to the amount of weight of zinc that is dissolved to take the place of the gold.

Q. Does the chemical action take place on the surface of the zinc? A. On the surface.

Q. Is the chemical action that takes place any different when the zinc is finely divided from what it is when it is not so finely divided, so far as a pure chemical action is concerned?

(Deposition of Thomas Price.)

A. There is no difference so far as the chemical reaction is produced, excepting that in a bar of zinc, the weight there for volume is very large, whereas, if it is rolled out into thin sheets, the same weight will have a larger volume, but no more gold is thrown down by the dissolving of the zinc than there is when it is in a more finely divided state.

Q. What advantage, then, would there be in having the zinc more finely divided?

A. In order that there may be a larger volume and a larger surface. For instance, to illustrate: Take, we will say, a square inch surface of zinc, that may be rolled out so as to have, we will say, a surface of perhaps eighteen inches by one inch in width, so that, as compared with the volume, it would precipitate in the rolled-out zinc eighteen times as rapidly, because it exposes that area of surface.

Q. I will hand you this patent, which is sued on in this case, and which was issued to Martin E. Waldstein, and ask you if you have read the specifications of that patent. A. Yes, sir, I have read the patent.

Q. If that patent were presented to you for the first time, as an expert in the art, and you were told to carry out the process described in that patent how would you proceed to carry it out, and what difficulties, if any, would you meet with in attempting to carry out that process?

A. The difficulty I meet with here is, that the explanation is not sufficiently clear, as it deals only with

(Deposition of Thomas Price.)

zinc-dust in a pure state, as well as pure cyanide of potassium solution. Ores carry other ingredients, such as arsenic, antimony, lead, cadmium, as well as any sulphuric acid that may have dissolved, or any other metals that may be present in minute quantities; all these would be dissolved by the cyanide of potassium just as well as the gold, and would also be precipitated by the zinc or decomposed by the zinc. Some of the metals would be precipitated, and the acid that may be there would decompose the cyanide of potassium.

Q. State whether or not, in your judgment as an expert in this line of business, it would be possible to carry out the process described in that patent, according to the letter of the patent?

A. It would be impossible, from the careful reading I have given to the patent, to follow that literally.

Q. Give your reasons for that opinion.

A. The reason is that he does not state anything there, excepting that the gold is precipitated from solution of cyanide of potassium by a definite and known quantity of zinc and that no more is to be added, without taking into consideration the fact that all these metals which I have mentioned already are also in solution, and further, that to add just the exact equivalent of zinc, that is, the equivalent by weight of gold, the cyanide of potassium solution would always be a strong one—that is to say, containing more cyanide of potassium than is necessary to dissolve the gold, and when adding only a

(Deposition of Thomas Price.)

sufficient quantity of zinc to precipitate the quantity of gold that the solution would contain, the moment they would commence to separate that gold by filtration or decantation, the cyanide of potassium being there in excess, and there being no metallic zinc, the cyanide of potassium would have a dissolving action on the gold already precipitated. When the separation of the gold is taking place, there must be an excess of zinc in whatever form it is used.

Q. Is zinc oxide a precipitant of gold from cyanide solutions? A. No, sir.

Q. What is the nature of zinc oxide?

A. Zinc oxide is simply a combination of metallic zinc with oxygen in the proportion of 32½ of zinc to 8 of oxygen. In other words, you may call it, as it is termed sometimes, "zinc rust," the same as you say oxide of iron is iron-rust.

Q. Then, it is in the nature of an impurity of the zinc?

A. It is an impurity of the zinc when the zinc is used for these purposes, for precipitation of metals.

Q. Is zinc oxide soluble in a cyanide solution?

A. Yes, sir.

Q. With what degree of rapidity is it soluble?

A. Half a per cent solution of cyanide of potassium will dissolve about 33 per cent of its on weight of oxide of zinc, that is, of the quantity of cyanide of potassium that is in solution.

Q. What do you understand to be the nature of zinc-dust or zinc-fume, so-called?

(Deposition of Thomas Price.)

A. Zinc-fume is a by-product formed in the manufacture of metallic zinc. I will have to explain briefly how zinc is manufactured. Zinc is first of all converted into an oxide—

Mr. ELLIS.—We object to that as immaterial, how zinc is manufactured.

A. (Continuing.) —if it is not already in an oxide state in its native condition. You mix the oxidized zinc with a certain quantity of pulverized hard coal, anthracite, if it is convenient, or charcoal will do. The mixture is then placed in retorts, and subjected to a process of distillation. In the carrying on of the operation on a large scale, it is impossible to exclude all of the air which contains the oxygen, so that the zinc which first volatilized over, comes in contact with the air which they have been unable to expel, and the temperature being a little low, a portion of the zinc will form, as it were, into a kind of cloud or dust, and being hot, the oxygen will combine with a portion of it, forming an oxide of zinc, generally covering the little pellets of metallic zinc that have formed. The zinc then travels on and condenses into a liquid state, and the zinc fume is this material which condenses first. This zinc fume is very uniform in its composition as manufactured in the manner I have now stated. It may contain all the way from five per cent to forty per cent oxide of zinc. I am speaking of just simply the ordinary commercial zinc fume, which is a by-product in the manufacture of metallic zinc, as already stated.

(Deposition of Thomas Price.)

Mr. MILLER.—Q. You have seen zinc in process of manufacture?

A. Yes, sir, I am perfectly familiar with the whole operation.

Q. Where have you seen it? A. In Swansea.

Q. Assuming that this zinc-dust or zinc fume is a mixture of zinc and zinc oxide, what would be the effect upon the zinc oxide when the mixture is placed in the cyanide solution?

A. The first thing to dissolve before any precipitation could take place would be the oxide of zinc forming on the surface, or which may be mechanically mixed with the metallic zinc.

Q. After the zinc oxide is dissolved, what would be left?

A. The metallic zinc would present a clean surface of metallic zinc, and the gold would then be precipitated on the surface of these particles of metallic zinc.

Q. State, in your opinion, Professor what would be the effect either one way or the other, of the zinc oxide, in hastening the precipitation of the gold in cyanide solution under the conditions stated.

A. There would be a retardation, or rather, it would not be precipitated as readily as it would be if the surface was absolutely pure zinc, without any coating of oxide.

Q. Do you mean, after the oxide coating got off the metallic zinc, that the action of precipitation would be hastened? A. Yes, sir.

(Deposition of Thomas Price.)

Q. I judge from what you say there is no chemical action between the oxide of zinc and the precipitation of gold? A. Absolutely none.

Q. And after you get rid of the oxide of zinc by the dissolving of it off, the precipitation of it would proceed?

A. It is at that time only that the precipitation could take place.

Q. Have you made any experiments in the line of dissolving the oxide from zinc dust, and noting what effect the residuum would have on the precipitation of gold from the cyanide solution? A. Yes, sir.

Q. State what you have done in that line.

A. I have found, as I have already stated that half a per cent solution of cyanide of potassium would dissolve one-third its weight of oxide of zinc, and further that, on adding oxide of zinc, absolutely free from metallic zinc, to a solution of gold, there was absolutely no precipitation.

Q. How did you dissolve the oxide from the zinc fume?

A. I dissolved the oxide of zinc for the purposes of my investigation, from the zinc by means of a very diluted solution of hydrochloric acid. There are, however, other solvents, but not as efficient or as rapid as this method, such as ammonia, chloride of ammonium, or ammonia carbonate.

Q. What zinc dust did you use in these experiments?

(Deposition of Thomas Price.)

A. I used in my experiments a very pure article, in my laboratory but being in a very finely divided state. Zinc fume, when separated from the oxide, will again re-oxidize rapidly on exposure to the air, especially if the air is moist. As a further illustration, to show the rapidity with which it oxidizes, if you take a body of zinc dust, or zinc fume, apparently free from large excesses of oxide or zinc, and moisten it, it will heat up and oxidize entirely.

Q. Is zinc dust, or zinc fume, a well-known article amongst chemists?

A. Yes, sir, it is well known. It is always used in the laboratory as a reducing agent.

Q. How long have you known it to be used in the laboratory as a reducing agent?

A. I have known it and had it in my laboratory during the last twenty-five years.

Q. You keep it in stock in your laboratory?

A. I have it in stock all along, and use it every day.

Q. In making these experiments which you have referred to after you had dissolved the oxide from the zinc, then what was left? A. Metallic zinc.

Q. Then how did you use that in precipitating the gold from cyanide solution?

A. I added that metallic powder to the solution of gold and cyanide of potassium, and passed a current of air slowly through it, so as to bring it in contact with the solution.

(Deposition of Thomas Price.)

Q. The current of air was for the purpose of agitation? A. Yes, sir, to keep it all in motion.

Q. What was the result?

A. The result was that the gold was precipitated. But I found it was necessary for me to add 33 per cent more zinc than the quantity of gold in solution indicated was the proper quantity for the reason that, there being always, in carrying on these experiments, as well as on a large scale, a large excess of cyanide of potassium, if I allowed the solution to stand a short time, the gold would redissolve, therefore, I kept an excess of zinc in the gold solution during filtration and separation of the gold.

Q. What was the comparative results between the precipitation of gold from cyanide solution by means of the zinc dust so-called before the oxide had been dissolved, and by the use of the pure or refined zinc dust resulting after you had dissolved off the oxide?

A. The gold did not precipitate as quickly as when the zinc was perfectly free from oxide. When using zinc powder or zinc fume or zinc dust—synonymous terms—it takes some time before any gold is observed, which forms a kind of purple color, which formed when it had no oxide over it.

Q. Do I understand from this that the purified zinc dust was quicker in the precipitation of gold than the impure zinc dust? A. Yes, sir.

Q. And you procured the purified zinc dust by dissolving off the oxide? A. Yes, sir.

(Deposition of Thomas Price.)

Q. What conclusions did you deduce from these experiments as to the action of the oxide of zinc in hastening the precipitation?

A. The oxide of zinc cannot possibly form any part in the precipitation. No reaction can possibly take place in the way of precipitating gold.

Q. Did you find that the precipitating action had hastened after the oxide action had been got rid of?

A. Until the oxide dissolved, there was no precipitation of the gold.

Q. When the oxide was dissolved, then what took place?

A. Then the precipitation of the gold took place rapidly.

Q. Your experiments demonstrated that?

A. Yes, sir.

Q. When did you make these experiments that you have been referring to?

A. During the last two weeks, more particularly. I may say in that connection that in my experiments that I am carrying on on the cyanide method of treating ores, I have been in the habit of using the zinc shavings and agitating the solution in order to effect a more rapid precipitation. I have also, in some experiments filtered my cyanide gold-bearing solutions through a column of zinc powder or zinc dust.

Q. Now, this Waldstein Patent describes or states that he uses just enough zinc dust to precipitate the

(Deposition of Thomas Price.)

precious metals contained in the solution and no more. If such a thing as that were possible, what would happen as soon as the gold in solution was thrown down, there being no excess of zinc dust left?

A. My interpretation of that is, that he has determined a quantity of gold that there is in solution, and that he then adds the equivalent quantity of zinc according to the zinc just necessary to precipitate the gold, which would be in the proportion of about one part zinc to six parts gold by weight, if that was the proportion, there being always an excess of cyanide that will have a tendency to redissolve itself, and by adding an excess, you have got enough zinc there acting on the cyanide while you are decanting or filtering, so that you have got your gold mixed with more or less zinc.

Q. Now, if you add just enough zinc to throw down the gold, and no more, then I understand that the gold which was thrown down would tend to be redissolved in the cyanide solution? A. Yes, sir.

Q. In that view of it what do you say as to the necessity of having an excess of zinc dust?

A. The excess is necessary, as I have explained, so that you are keeping the metallic zinc in contact with your solution while you are separating it, and consequently all the gold will remain in a solid state; whereas if you add just enough to precipitate it, and we will suppose there was an instant when the gold was all down, and you could not immediately filter that solu-

(Deposition of Thomas Price.)

tion as long as that was in contact with free cyanide of potassium, which is always in excess, it was bound to dissolve some of it, whereas, if you are filtering it from a solution that is already precipitated, and an excess of zinc during the process of filtration, no gold could go into solution, because it would dissolve the zinc in preference to the gold, it being more soluble than the gold.

Q. What do you say, then, as to the necessity of using an excess of zinc dust in precipitating the gold?

A. I have no hesitation in saying that from my own personal experience, not only with powdered zinc, but all sorts, you must always have a large excess of metallic zinc before you can recover the whole of your gold.

Q. In that way, I understand, after the gold is precipitated by having an excess of zinc dust, you maintain a kind of chemical equilibrium that contains the gold as it is thrown down?

A. Yes, sir. When you have precipitated your gold, and added just a sufficient quantity of zinc that practice demonstrates, and allow that solution to stand an instant, there being always an excess of cyanide of potassium in solution the gold will immediately commence to redissolve while you are manipulating, whereas, if there is an excess of zinc over and above the maximum amount of zinc necessary to dissolve the gold, the excess of zinc being there while you are manipulating the cyanide of potassium, it will dissolve the zinc and not the

(Deposition of Thomas Price.)

gold, so that you will have a residuum on your filter, if filtration is being done, containing more or less zinc with the gold.

Q. What are the atomic weights of zinc and gold?

A. The atomic weight of zinc is 65.1. The atomic weight of gold is 196.2.

Q. I call your attention to a paper that was read by Professor Livingstone Sulman before the Fifth Ordinary Meeting of the Fourth Session of the Institution of Mining and Metallurgy, of London, on the 20th of February, 1895, as reported in the records of that society, where he speaks of the action of zinc dust in precipitating gold from cyanide solution, and says, in reference to this zinc dust: "It is in fact an impalpable metallic flour, and viewed under the miscroscope is seen to consist of spheres more or less coated with oxide. The presence of the latter renders the action of the untreated product somewhat slow as a gold precipitant, but on shaking the fume with a dilute solution of ammonia of ammonium chloride, or carbonate, or with any other suitable solvent for zinc oxide, and stirring the deposited fume with water, a metallic emulsion is produced, which exhibits remarkable gold-precipitating power." Have you read that article?

A. I have read that article, and also an article which he read a month later before the Chemical Metallurgy Society of South Africa.

Q. Do you agree with his statements there in general as to the action of this zinc oxide?

(Deposition of Thomas Price.)

A. Yes, sir, I am entirely in accord with it.

Q. That is correct chemistry, is it?

A. Yes, sir. But I want to explain that that is not the first time that I knew of zinc dust being used. I learned from reading extracts from papers that he read which were published in the Engineering and Mining Journal of New York, and other scientific papers, in the year 1895, and later from extracts and discussions of the last paper read. I mean to say that I had read the articles long before I made my experiments two weeks ago.

Q. Further along upon the same page of this report, Professor Sulman says, in reference to zinc dust, as follows: "Owing to the extreme fineness of its particles, the zinc can be rapidly brought into almost molecular contact with the dissolved gold, and by regulating the quantity of precipitant according to the work to be done, it is never in large excess at any moment, and a considerable economy is thus effected." What is meant by that expression, that the zinc, owing to its fineness, can be brought into almost molecular contact with the dissolved gold?

A. For instance, a small quantity of zinc by weight will, when converted into zinc dust or fume, or which existed in the form of fume, have many thousand times as much surface as would the same weight of metallic zinc in a filiform or shaving or rolled zinc.

Q. If you were to take a pound of buck-shot, and con-

(Deposition of Thomas Price.)

vert it into a pound of bird-shot, you would have a greater surface in the latter case?

A. Yes, sir; the finer it is, the greater the surface, because each particle has a surface of its own. No matter how fine it is, each little pellet, if it is one-millionth part of a grain, has its surface.

Q. I understand that this chemical action takes place on the surface?

A. Yes, sir, on the surface, and it dissolves. It dissolves the mechanical surface underneath it, and the precipitation of the gold increases in thickness as the zinc dissolves.

Q. How long have you known in chemistry of the use of agitation for bringing two substances into closer contact for the purpose of producing a chemical union?

A. I have known that as long as I have studied chemistry.

Q. That is a very old thing in chemistry, is it?

A. Yes, sir; substances, for instance, that I would deal with in the precipitation which I would have to allow to remain at rest for about twenty-four hours, I can, by agitation, produce the same amount of precipitation in ten minutes.

Q. That is a well-known process in chemistry?

A. Yes, sir.

Q. And the sole object of that, I understand, is to bring the two substances in closer contact?

A. If I want to get into solution a piece of iron ore or copper ore, the finer I pulverize it, the quicker I

(Deposition of Thomas Price.)

will get it in solution. If I take a piece as large as my fist, it would take two or three weeks or more to dissolve.

Q. These experiments which I understand you to have made, were made recently, were they?

A. Some of these experiments were made recently, but I have been experimenting in a professional way in my laboratory ever since 1884. I first met a representative of the MacArthur-Forrest process in New York, and at that time and ever since then, I have been more or less obtaining samples from all over the country for treatment, to find out if they are amenable for the extracting of the gold by cyanide of potassium solutions.

Q. I judge, then, Professor, you have been familiar more or less with the cyanide principle ever since it has been used in this country?

A. Yes, sir; that is, in fact, the first place to which it was ever brought. I do not remember the name of the man who brought it. One of the Baring Brothers introduced him to me, and he afterwards went down to Oregon.

Mr. ELLIS.—I move to strike out, as irrelevant and immaterial, what one of the Baring Brothers told the witness.

Mr. MILLER.—Q. I understand that the experiments which you made with zinc dust in its ordinary from, and the zinc dust after it was freed from its oxide, being then pure zinc dust, we will say, were made with

(Deposition of Thomas Price.)

the view of determining the relative precipitating powers of the two forms of zinc? A. Yes, sir.

Q. You found that the zinc dust, when freed of its oxide, had greater precipitating powers than when it contained oxide?

A. Yes, sir. I made that in order that I might be able to testify positively, of my own personal knowledge, taking cognizance of that fact. It was absolutely unnecessary for any chemist to make such an experiment, because it is a well-known fact that no oxide or compound can throw down a metal.

Q. I understand you had your chemical experience before hand, but you made these experiments to verify it? A. Yes, sir.

Q. And you found that your experiments verified your theory? A. Yes, sir.

Q. What was it you said in regard to the impossibility of the oxide of a metal acting as a precipitant for throwing down gold?

A. I simply said that it was an impossibility.

Cross-Examination.

Mr. ELLIS.—Q. I believe you stated that you have been in this country since October, 1852?

A. No, sir, 1862. On October 6, 1862, I arrived here.

Q. I understood you to say, Professor, you first made experiments with the MacArthur-Forrest process in 1884? A. Yes, sir.

(Deposition of Thomas Price.)

Q. Had the MacArthur-Forrest process been discovered at that time and patented?

A. I could not tell you whether it was or not. I can simply tell you that a gentleman in New York introduced to me by the Barings—

Q. Answer my question. Had the MacArthur-Forrest process been discovered at that time and patented?

A. I will simply say that I made experiments following my return.

Q. For the MacArthur-Forrest people?

A. No, sir, not for the MacArthur-Forrest people.

Q. I understood you to say, Professor, upon your direct examination that you met a representative of the MacArthur-Forrest people in New York in 1884, and you made some experiments for them. Now, I will ask you if it is not a fact that the MacArthur-Forrest process was not patented until December, 1889?

A. I don't remember the date of the patent at all.

Q. But, with that process you made experiments in 1884, five years before it was patented?

A. Yes, sir, in 1884, if it was that.

Q. Now, I judge, from your direct examination, that the use of zinc dust, in which we understand is zinc and a zinc oxide, as a by-product as stated by you, that that is not as useful or as beneficial for the precipitation of gold from cyanide solution as mechanically or finely divided pure zinc? Am I to understand that from your answer?

(Deposition of Thomas Price.)

A. No, sir, that is not what I intended. I meant to say that until the oxide is removed from it, it is not.

Q. Why is it, if the use of zinc and zinc oxide, such as you have described zinc fume, is not as beneficial in the precipitation of gold from the cyanide solution as the pure zinc, that zinc dust is used at all, if you can obtain the same results from pure zinc in a finely divided state?

A. I do not know the reason why. I am simply telling you, as long as there is any oxide of zinc present, there is no precipitating action.

Q. Would it not be more beneficial, in view of your statement that the zinc oxide retards precipitation, to use a finely divided pure zinc? Would you not get a quicker and more thorough precipitation than to use the zinc dust or fume we have been talking about?

A. If you get it in the same state of subdivision as it is in the zinc fume.

Q. Is it not possible to take pure zinc, or massive zinc, and so divide it mechanically as to put it in a finely divided state of subdivision as zinc dust?

A. Yes, sir.

Q. Then the use of zinc made into a dust by mechanical means, and not by this process of distillation, would be more beneficial than to use the zinc dust produced in the manner you have described I take it?

A. I think you have got yourself mixed. I simply say this—

(Deposition of Thomas Price.)

Q. (Interrupting.) Answer the question, if you please. A. I do not understand the question.

Q. Read the question, Mr. Reporter.

(The reporter reads the question as follows: "Then the use of zinc made into a dust by mechanical means, and not by this process of distillation, would be more beneficial than to use the zinc dust produced in the manner you have described, I take it?")

A. Yes, sir, than the zinc fume of commerce.

Q. Now, I understand you to say, Professor Price, that the zinc oxide which is part of the zinc fumes that we have been talking about, is soluble in a cyanide of potassium solution? A. Yes, sir.

Q. Is there any chemical action produced by the cyanide of potassium dissolving this zinc oxide?

A. The very fact of its dissolving indicates that a chemical reaction takes place. The fact that it goes into solution is itself a chemical reaction.

Q. Metallic zinc is also soluble in cyanide of potassium solution to more or less extent?

A. Yes, sir, but not to such an extent as the oxide.

Q. Is there any electro-chemical action produced by the dissolving of the zinc oxide from the zinc fumes in the cyanide of potassium solution?

A. There is, of course, during the chemical action dissolving the oxide of zinc, an electro-motive force produced, but the electro-motive force is not increased simply by the presence of oxide of zinc; metallic zinc also emits a slight electro-motive force.

(Deposition of Thomas Price.)

Q. Now, Professor Price, you say that the use of zinc fumes retards the action of zinc as a precipitating reagent in a cyanide of potassium solution containing gold.

A. I simply said the oxide present—I want you to understand that. It is possible to produce zinc fumes when you manufacture for the purpose of making zinc fumes without any oxide. You must keep it out of contact with the air.

Q. The zinc fumes that are dealt with in this patent are zinc fumes composed of zinc and zinc oxide?

A. Yes, sir.

Q. That means, as I understand your testimony so far, metallic zinc coated with zinc oxide?

A. Yes, sir, and also mechanically mixed.

Q. These zinc fumes that I am speaking of, I mean the zinc fumes described in this patent, the zinc and the zinc oxide, I understand you to say that the use of that retards the precipitation of gold from a solution of cyanide of potassium containing gold; is that correct?

A. A zinc fume will retard the precipitation of gold as compared with zinc fume free from oxide in proportion to the amount of oxide that is mixed with it, as oxide of zinc.

Q. That retardation of the action of the precipitant is simply a question of time, is it not?

A. Of course, yes, sir.

Q. Let me ask you: Is that time appreciable?

A. It would depend entirely on the strength of the cyanide solution.

(Deposition of Thomas Price.)

Q. The precipitating power of any zinc depends on the strength of the solution?

A. There are different strengths of solutions. Some ores you can use with very much weaker solutions than others; that is to say, you can extract the gold with cyanide of potassium from some ores with a weaker solution than you can with other ores.

Q. That would be equally true, I take it, with a pure cyanide from which the element of oxide has been eliminated? A. Yes, sir.

Q. Other things being equal, the only retarding source that the oxide of zinc, or this enveloping oxide, has on the precipitating power on the zinc and the zinc oxide, is the element of time—other things being equal?

A. Yes, sir. But there is also something else. The patent claims that the zinc fume prevents the fouling of solution. If there is oxide of zinc present, that oxide of zinc dissolves in the cyanide of potassium, and consequently fouls it to the extent of the oxide of zinc present, in addition to the fouling that is produced by the presence of other metals than gold that may be present in the cyanide solution of the ore.

Q. Now, Professor, how appreciable is the amount of time that it requires for the solution of oxide of potassium to dissolve the zinc oxide?

A. It took me, in experiments that I made in dissolving the oxide, about two hours to dissolve one-tenth of the weight of the cyanide present in the solution.

(Deposition of Thomas Price.)

Then, by allowing it to stand for two or three hours, I found that one-third of the weight of the oxide of zinc present had dissolved.

Q. So that it takes from two to four hours to dissolve the coating of zinc oxide?

A. No, sir, I would not say that. I was obliged to take the pure zinc oxide in a finely divided state.

Q. That is what I want you to say. You are here as an expert. I want you to tell me of the time. You say it is an element of time. I want to know how appreciable is the time.

A. You must tell me the strength of the cyanide of potassium solution.

Q. In your experiments, that is what I want to know.

A. I tried it on the oxide of zinc.

Q. You did not take the zinc fumes?

A. Yes, I did have some zinc fumes containing oxide. Zinc oxide is an exceedingly difficult thing to obtain. It is more or less mixed with a sub-oxide of zinc and other impurities, and consequently, unless I know the amount of it, I should say that that oxide would not dissolve in less than an hour.

Q. Did you read the deposition of Mr. Low, the chemist, who was called as an expert on behalf of the defendant in this case? A. I read some portions of it.

Q. You remember that he stated in that deposition that the amount of time required to dissolve the zinc oxide and in the precipitation of gold was infinitely an inappreciable amount of time?

(Deposition of Thomas Price.)

A. I think he said something like that.

Q. You disagree with him?

A. No, sir, I am simply giving you the result of my own personal experience.

Q. Do you think that the detrimental feature from the presence of zinc oxide in the zinc fumes as a precipitating reagent is overcome at all by the electro-motive action that is exerted by the use of zinc fumes?

A. No, sir, I do not think so.

Q. I understand you to say that all the experiments you have made respecting this process have been laboratory experiments? A. Yes, sir.

Q. You have made no experiments on a commercial scale? A. No, sir.

Q. If, in the use of this zinc fume, as claimed in this patent, on a commercial scale, at the rate of from one hundred to one thousand tons a day, the precipitation is brought about in fifteen minutes, and all the gold precipitated by the use of that reagent, and by the use of pure zinc in a mechanically divided state, a precipitation takes ten times that long, would you not say that the zinc fume is a better precipitant than the zinc?

A. I coincide entirely that the more finely divided the zinc is, the more rapidly it will precipitate.

Q. You also stated a moment ago that you can place pure zinc in as finely a divided state of subdivision as you can zinc fumes? A. Yes, sir.

Q. Without the presence of the zinc oxide?

A. Yes, sir.

(Deposition of Thomas Price.)

Q. Now, if, in actual experience, the use of zinc fumes will precipitate the gold from a cyanide solution in one-tenth of the time that the mechanically divided zinc will do it, would you not say that the zinc fumes is a better precipitating reagent than the zinc so divided?

A. No, sir, I should say it is an absolute impossibility.

Q. Assuming that to be the fact.

A. I demand my right to explain that.

Q. Assuming that to be the fact, what would your answer be?

A. I simply say, if the pure zinc is made mechanically into as finely divided a state as zinc fume, there could be no practical difference between them.

Q. I am assuming that. If your result in the one case were ten times as rapid as it is in the other, under the assumption that you would make, would you not say that the zinc dust is a better precipitating agent?

A. Certainly.

Q. Assuming that that is the fact.

A. I do not assume anything.

Q. Experts never assume anything. Assuming that to be the fact, and that it would be a better precipitating reagent, would it not be possible to account for the fact that it is a better precipitating reagent, that there is an electro-motive force which makes the precipitation much more rapid in the one case than in the

(Deposition of Thomas Price.)

other, or if that be not the case, how would you account for it as an expert?

A. I cannot account for it. I can only say, from what I know of electricity, that all substances, when dissolved, produce an electro-motive force.

Q. Otherwise you cannot account for it?

A. No, sir.

Q. Now, Professor, I understood you to say that it is always necessary, in the use of a precipitating reagent, especially zinc or zinc-fumes or zinc dust, that in order to precipitate the gold and keep it precipitated, you must use an excess of the precipitating reagent?

A. Yes, sir.

Q. That is a general chemical fact, is it not?

A. Yes, sir.

Q. True not only of this process, but of all processes?

A. Yes, sir.

Q. It is a fact known to all chemists that, in ascertaining an exact amount, or an exact chemical equation, theoretically, that when you come to use that equation, practically you differ from it somewhat, and use an excess, do you not, especially in the case of these chemical processes?

A. Yes, sir, and especially in this case, for the reason that there is always an excess of cyanide of potassium in solution. If the solution had been perfectly neutral cyanide of gold, there need not be an excess. You understand, I am qualifying that: When you add a reagent so as to produce a precipitant, and the solutions

(Deposition of Thomas Price.)

are neutral, and the resulting precipitant is not soluble in the resulting solution, of course you do not want an excess.

Q. I understand that, but in these cyanide of potassium solutions there is always an excess of the solution?

A. Yes, sir.

Q. So that, in order to precipitate the contained gold in the solution, it is always necessary to exceed the chemical equation? A. Yes, sir.

Q. That is known to all experts and chemists, is it not? A. Yes, sir.

Q. It ought to be known, anyway?

A. It ought to be known to all analytical chemists. Manufacturing chemists all know it.

Q. So that when you have a given formula presented to you in the shape of a process, that you must use a certain and definite amount of a precipitating reagent to accomplish certain results, and that is presented to you by a person first in the art, you know that he means to use more than the equation, do you not?

A. Yes, sir, under the conditions I am telling you, when the resulting solution will dissolve the precipitant formed.

Q I understand. We will assume that in a cyanide of potassium solution containing the gold, there is an excess of the cyanide of potassium. A. Yes, sir.

Q. So that if a man presented to you a process which stated that he used an exact amount, or a definite amount, in a given solution, to produce a given result,

(Deposition of Thomas Price.)

and thoroughly precipitate the contained metal, you would not understand, would you, that he was using the exact chemical equation, and that you must follow that literally?

A. Perhaps as a chemist I would not think that the man meant that.

Q. Knowing he was an expert versed in the art, and spoke as an expert, you would say that he intended to use, not a direct chemical equation, but an excess?

A. Yes, sir.

Q. So that in this Waldstein patent, when he says you must use an exact definite amount, assuming for the time being that the patentee was a chemist versed in the art, you would not say that he meant to say you must use the exact chemical equation?

A. If you are talking to me as a chemist—

Q. From your experience as a chemist.

A. On that question I would say that the man should be more explicit. I have had something to do with patents myself, and I have always understood that the patent must be exact.

Q. That is very true.

A. So that a man who is tolerably well-versed can go and do it.

Q. If you were given a patent as an expert, to carry out a certain process, and the patentee said in his patent, in his claim, that you must use a definite amount to thoroughly precipitate a given metal, and keep it

(Deposition of Thomas Price.)

thoroughly precipitated, you would figure out the exact chemical equation, and not vary from that a jot or tittle, as an expert, as a chemist, would you?

A. I must know the nature and character of the substance I have to deal with. If that thing were submitted to me, I would say that, to carry out the strict letter of the wording of the patent, it could not be done.

Q. If it were submitted to you as a chemist, you would say that you must use the exact chemical equation?

A. As a chemist, I would go further and simply say as to whether he used a sphere of zinc or pulverized zinc, it is a chemical reaction, and I do not believe that a chemical reaction should be patented.

Q. That is for the Court to determine, whether it should be or not.

A. You are asking me the question, and I am telling you.

Q. I am asking you as an expert, as a chemist, whether you would use, in a case of that kind, the theoretical equation, or whether you would put to use your experience and learning in a particular art, and figure it out as a chemist or as a layman.

A. If I were going to make that patent such as Waldstein has—that is what you want—

Q. Answer my question, and you can explain yourself afterwards.

A. It is very diffusive. I cannot answer, as it is too diffusive. I should say that to use the minimum quan-

(Deposition of Thomas Price.)

tity of zinc needed until you find that the gold had all been precipitated, and then add an excess of zinc in the form of powder to keep the gold from dissolving during the filtration or decantation, under such conditions there would be no chance of the gold dissolving in the excess of cyanide.

Q. That is the answer I want. That is the answer of the expert, and that is what I want. I understood you to say that from an examination of the Waldstein Patent, that you would say it was impracticable, because, in addition to using an exact amount, you could not tell what was in the zinc fumes, that there might be copper, cadmium and antimony— A. Arsenic.

Q. And various other metals. A. Yes, sir.

Q. Is it not possible for a chemist or metallurgical analyst to ascertain what is in the zinc fumes?

A. Certainly; that is the way he knows what it does contain.

Q. You can obtain the proportions of the various impurities? A. Yes, sir.

Q. Those impurities in the use of that substance, I take it, can be definitely allowed for by the chemist, can they not, their action and result upon a given solution?

A. He should do it. A man should know.

Q. That can be ascertained?

A. Yes, sir. In explanation further, I will say that this zinc fume is liable to contain arsenic, copper, cad-

(Deposition of Thomas Price.)

mium and antimony, all of which would be taken up by the cyanide of potassium. That is what I am saying. The cyanide in solution would become more foul.

Q. That can all be allowed for an ascertained definitely? A. Certainly.

Q. So that in the application of this patent, that would not be an insuperable obstacle, would it?

A. No, sir. The only question is, whether you consume so much zinc. The lead and copper and antimony and arsenic present in the solution as cyanides. will be precipitated as well as the gold, and consequently increase the consumption of zinc.

Q. All I want to get at is, that would not be an insuperable obstacle to the application of the patent?

A. No, sir.

Q. I do not mean the application of the Patent Office, but the application of its use.

A. Certainly.

Q. I have a note here, Professor, that you said that, in using zinc as a precipitating reagent, you use one part of zinc to six parts of gold in weight.

A. That is what we call an equivalent.

Q. That is the chemical equation?

A. Yes, sir, one to six. One pound of zinc will throw down six pounds of gold from any solution of gold.

Q. So that if you had ten times of cyanide of potassium in solution which assays $20.00 a ton, or one

(Deposition of Thomas Price.)

ounce, you would then, in order to precipitate that gold from the solution, put in zinc in a ratio of one to six approximately in weight? A. Yes, sir.

Q. That is the chemical equivalent?

A. Yes, sir.

Q. That is, in actual practice you would put in a slight excess?

A. I would put in 33 per cent more before I could collect all my gold.

Q. In the use of this Waldstein process or patent, being able, as you have heretofore stated, to determine just the effect of the various elements of impurities that are in that solution, and knowing that you use one part of zinc to six parts of gold in weight, would it not be possible to take this patent and process and determine the amount of zinc dust to be used to precipitate the gold thoroughly?

A. If it is an absolutely pure solution, yes. But cyanide of potassium solutions dissolve, not only the gold, but other metals that may be present, like traces of copper, traces of arsenic, and traces of antimony.

Q. That, I take it, would be true in any use of zinc?

A. Yes, sir.

Q. That would not be an obstacle especially to this particular process? A. Excepting the expense.

Q. Do you know the comparative cost of zinc fumes and mechanically divided zinc in form of an impalpable powder?

(Deposition of Thomas Price.)

A. No, sir, I only know what they claim in the patent, that they get it for one and one-half cents a pound.

Q. Assuming that the cost of zinc dust or zinc fumes, as claimed in this patent, as set forth, is very much cheaper than the cost of finely divided pure zinc, do you not think that that would render the use of the zinc fumes preferable to the use of pure zinc in a finely divided state?

A. Yes, sir, if the quantity of absolute metallic zinc contained in one pound of pure zinc, the one would be the equivalent to the other.

Q. One would be cheaper than the other?

A. Of course. I think I ought to say more in answer to that question. I should say simply, if zinc fume can be obtained much cheaper than zinc mechanically subdivided, it is a proof to my mind, that it cannot contain a higher percentage of metallic zinc, for this reason: If you have zinc fume, and there is practically no oxide in it, we will say five or ten per cent, I cannot see any reason why you should sell for one and a half cents a pound this zinc fume, which is worth six cents at least, because all you would have to do would be to put that zinc fume in an iron kettle, and put a few shovelfuls of fine charcoal in, and put heat under it, and the metallic zinc will melt, and you will get solid zinc, and the oxide of zinc would be floating on the surface.

(Deposition of Thomas Price.)

Q. Is it not the fact that for many years in the zinc refineries of this country, and of Swansea, and Europe, chemists have been endeavoring to devise means of converting the refuse zinc fume into metallic zinc, and have not been able to do so?

A. No, sir, I do not know it.

Q. Do you say that is not the fact?

A. I can tell you from my own personal knowledge—

Q. (Interrupting.) Answer my question, Professor: Do you say that is not a fact?

A. I say it is not a fact, because I have seen it done myself. All you have got to do would be to take zinc fume, and to mix it—

Q. (Interrupting.) I object to the witness interjecting. You have answered the question. It is not a fact, and that is all I asked you. I understood you to say, Professor, that you are familiar with the MacArthur-Forrest process? A. Yes, sir.

Q. When did you first become familiar with that process? I believe you answered that and said in 1884?

A. Yes, sir.

Q. At what different reduction works have you observed that process, if any?

A. I have seen it in two places, at El Dorado County at the Taylor Mine, and at the Gentle Annie Mine.

Q. Were those reduction works under your personal supervision or direction? A. No, sir.